Game Theory Bargaining and Auction Strategies

Practical Examples from Internet Auctions to Investment Banking

Gregor Berz

Second Edition

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Preface to the first edition

This book bridges the gulf between theoretical economic principles of negotiation and auction theory and their multifaceted applications in actual practice. It was written with a more general readership in mind and, as a consequence, does not contain the equations familiar only to highly specialized experts. I would like to make this theory easy to understand and concise and consequently this book does not contain any equations. For those familiar with the mathematics I recommend the corresponding chapters in *Topics in Microeconomics* by Elmar Wolfstetter, the two books of the great auction theoretician Paul Milgrom *Putting Auction Theory to Work* and Paul Klemperer's *Auctions: Theory and Practice*, published in 2004, as well as the very concise and precise booklet *An Introduction to Auction Theory* by Flavio M. Menzenes and Paulo K. Monteiro.

My book is meant to be a supplement to the already existing literature in the form of a comprehensive collection of reports about experiences and results of very different negotiations and auctions, which I explain using their relevant theoretical aspects. It is meant to contribute to shaping the application of game theory appropriately in the actual practice of price negotiations. Scholars and students of economics can also read this book as feedback from practitioners about the applicability and relevance of current research. It contains numerous valuable insights for those involved in negotiations, especially auctions, to help increase personal success. Finally, only a combination of clever negotiation tactics and profound knowledge of the economic aspects of bargaining theory can ensure sustainable and repeatable negotiation success. I can highly recommend Fisher, Ury and Patton *Getting to Yes* or the writings by Herb Cohen, *Negotiate This! By Caring, But Not T-H-A-T Much*.

This book would not have been possible without enthusiastic support of my colleagues and friends. I am especially grateful for the general concepts from the perspective of a practitioner, Johannes Schmohl (Artemis Partners, Geneva), an auction theorist, Dr. Ralf Gampfer (Institut für Angewandtes Mechanism Design (IFAMD) GmbH, Munich), and a journalist, Martin Reim (Süddeutsche Zeitung, Munich). I would like to thank Verena and Winfried Heppner for their patient corrections

of my drafts and Bernd Marquard for his invaluable editorial suggestions. My collection of notes and thoughts would certainly not have become a printable book without their help. My most heartfelt thanks once again to all those involved.

Starnberg, July 2007
Dr. Gregor Berz

Preface to the second edition

Seven years have passed since the first edition of this book was published in Germany (*Spieltheoretische Verhandlungs- und Auktionsstrategien,* Schäffer-Poeschel, 2007). In the meantime further Nobel Prizes of economics have been awarded to game theorists: In 2007 to Leonid Hurwicz, Eric S. Maskin and Roger B. Myerson for their work in mechanism design theory and in 2012 to Alvin Roth and Lloyd S. Shapley. But also in business practice, the influence of game theory has been growing. The application of game theory for example, for the preparation of price negotiations on both the procurement and sales side of companies has come to be an established strategy development method that is – albeit "highly sophisticated" – recognized as effective and successful. I would be thankful if this book has been able to contribute to that.

The motivation for a second edition and its translation into English sprang from numerous practical cases we have been in charge of in the meantime in several industries. Also external developments have taken place that should not be left unmentioned. Just recently a public facility *Markttransparenzstelle für Kraftstoffe* ("transparency center for fuel") was introduced in Germany that is supposed to enhance competition for fuel prices. Section 4.2 discusses the gas station market and has become unexpectedly topical in view of the new transparency center. Another example is the combinatorial shopping cart auctions of a leading European business procurement platform. They are theoretically well-thought-out, but in practice the acceptance among both suppliers and customers could be better. In Section 2.1 we discuss advantages of these auctions for both sides of the market. Finally, Sections 2 and 3 had to be cleared of online auction platforms that don't play the role anymore that they had in 2007 when the first edition was published.

The opportunity of reviewing the book has enabled me to incorporate certain improvements which have been collected over the years. For example, I have included some of Prof. Elmar Wolfstetter's ideas in Chapter 3 "Negotiations for Several Objects", which could not be considered in the first edition for editorial reasons. Likewise, I could close a gap of content in Section 8.3 "The best way to deal with cartels" by incorporating the real case of negotiating special lacquers in the automotive industry, where collusive behavior of market participants was broken up successfully.

My thanks go today to all my companions in the last years without whom I would not have been able to execute lots of highly interesting and thrilling business projects of game theory, consulting on the highest level. In particular, I want to mention my partner at *Institute for Applied Mechanism Design (IFAMD)* Prof. Dr. Ralf Gampfer, our highly estimated colleague Alexander Bergmann and our scientific adviser Prof. Manfred J. Holler, University of Hamburg, who contributed some essential thoughts to the second edition. Finally, I want to thank my former employer Arthur D. Little for sponsoring the translation of the manuscript into English.

Dießen, May 2014
Dr. Gregor Berz

Foreword to the second edition

"Game theory is fun." This was my answer to the students who followed my game theory course and who wanted to know why we were doing this course. Acknowledging the heavy irritation in their faces, I qualified my statement telling them that game theory is inspiring, entertaining, rewarding, challenging, demanding, and helpful. Gregor Berz's book focuses on presenting game theory as inspiring and helpful. There are many pages in this book that are fun to read, especially when real life cases lead to surprisingly paradoxical results. Applying game theory to these cases is like a detective story – most inspiring. However, the degree of inspiration we get from this book depends on our willingness to enjoy complex issues, and this capacity varies from person to person, but also from page to page and its potential seems to be unlimited. As the number of pages for this preface is limited I better consider the argument that game theory is helpful, more so because this book was written to bridge the gap between the theoretical findings of theories of bargaining and auction theory and their application in the real-world economy. The author intended to make game theoretical concepts and results available to managers or, more generally, decision makers. Therefore, it seems fair to elaborate on the question of whether game theory can be of any help to them.

Game theory presents straightforward analytical solutions to some prominent strategic decision problems, most prominent to the prisoners' dilemma game that illustrates the tension between individual rationality and social efficiency as the players could do better if *both* choose a dominated strategy – but rational players don't. Prisoners' dilemma situations are ubiquitous. No wonder that their analysis even entered beginner textbooks of microeconomics. More demanding is the equilibrium solution of a second-price sealed-bid auction proposed by Nobel laureate William Vickrey. It makes use of the subgame-perfectness concept proposed by Reinhard Selten, another Nobel laureate. However, there are many decision situations that have, different from the prisoners' dilemma game, more than one Nash equilibrium and, contrary to the Vickrey case, the application of a refinement of the equilibrium concept does not always propose a convincing outcome and corresponding individual choices. The game theoretical analysis demonstrates that these decision situations are complex and this complexity cannot be solved by the players

when making their choices. In a chicken game, characterized by two equilibria in pure strategies and one in mixed strategies, every choice is "rationalizable," that is, justifiable as a rational choice. As the inspection game demonstrates, multiplicity of equilibria is not necessary for such a complexity: the game has a single Nash equilibrium which, however, is mixed. As a consequence, whatever the players choose their behavior will be rationalizable.

Game theory reveals such complexity, yet it cannot reduce it – it has to be reduced by those who control the decision situation, that is, who design the game. Gregor Berz's book gives a series of very convincing answers of how to accomplish this task, for example, through structuring of bargaining and the design of auctions – which fall into the category of mechanism design, a game theoretical application that has been honored by the 2007 Nobel prize to Leonid Hurwicz, Eric Maskin, and Roger Myerson. However, game theoretical analysis also discloses the reverse phenomenon: often politicians and managers try to make decision situations more complex than they actually are in order to shift responsibility and to undermine the power of voters and stakeholders, respectively, by dwarfing their decisiveness.

Munich, October 2014

Prof. Manfred J. Holler
University of Hamburg, CCR and ISE

Dr. Gregor Berz
Photo: Anne Huneck

Introduction

Auctions are becoming increasingly popular throughout the economy: In addition to the online varieties, there are auctions for the sale of everything from business-to-business contracts, real estate, business models and whole companies. All these auctions, which exemplify one special form of intensely competitive negotiation, are subject to the same economic and psychological norms. More broadly, the same or similar behavioral norms apply to any negotiations between two or more parties. The study of these norms is basically what has come to be known as game theory.

Game theorists, influenced by mathematical economics, attempt to predict the behavior of rationally acting "players" and, based on their predictions, recommend to real players how they should behave. By recommending the best strategy to players in situations of strategic interaction between various parties, game theorists optimize their behavior. Actually, game theory would be better called "strategy theory", but unfortunately the term developed differently. The term is especially unfortunate in English; "game theory" has nothing to do with gambling! The false association of the term "game theory" with gambling and casinos has cost many game theoreticians the attention of managers who are quick to make judgments. Managers are not so much interested in games of chance as they are in strategies, which are also the focus of attention in game theory. In game theory, the term strategy has a precise meaning extremely relevant to day-to-day business. Game theory essentially anticipates the behavior of other "players" and deduces from that specific, best strategies for the benefit of one player. Perhaps the most impressive description of how game theory methods influence the development of business strategies, helped by numerous examples, is contained in the now classic *Co-opetition*, a book by Barry J. Nalebuff and Adam M. Brandenburger.

The vital importance of that game theory to the discipline of economics has also been evidenced by the numerous Nobel Prizes awarded to game theoreticians. At least a few of these should be mentioned here: John F. Nash, who developed a concept which later became known as the Nash equilibrium, the most important tool of game theory; Reinhard Selten, the only German Nobel Prize winner in economics untill now; Robert J. Aumann and Thomas C. Schelling, Nobel Prize winners in 2005, and Sir William Vickrey, founder[1] of auction theory, which underlines the significance of this special field of research within game theory.

The influence of game theory on economic and political philosophy has also been examined critically, especially in the Anglo-American world.

Thomas Schelling's book *The Strategy of Conflict* is considered as one of the 100 books with the greatest influence on the Western world after 1945. Schelling provides a game theory analysis of military conflicts in *Arms and Influence*.

As a field of research within game theory, *bargaining theory* deals with negotiations between two or more parties. A special negotiation situation exists when one of the parties holds an auction among competing negotiation partners. The results of game theory for this special situation create a beautiful theory complete in itself, called *auction theory*. It is receiving increasing attention and application in actual practice, above all against the background of the growing popularity of auctions.

The multifaceted results of negotiations in general are less clearly delimited as a theory. Game theory literature distinguishes between *cooperative* and *non-cooperative bargaining theory*. The cooperative bargaining theory provides "negotiation solutions", which – suggested by an imaginary "mediator" – both negotiation parties accept. As an example, we will get to know the negotiation solution of "meeting each other halfway" in Section 1.2. Non-cooperative bargaining theory investigates the results of possible negotiation processes, that is, submission of mutual offers under specific rules that the negotiation parties agree to in advance. As an example, we will discuss the exchange of sealed bids in Sections 1.3 and 5.5. For negotiation practice, above all the logic and laws of auction theory have a wide-ranging relevance in addition to the results of cooperative and non-cooperative bargaining theory. Auction topics such as the power via alternatives, the role of commitment, the perfect timing, handling of (asymmetric) information and signaling games can be found in the celebrated book by the American negotiator Herb Cohen, *Negotiate This! By Caring, But Not T-H-A-T Much* – although this almost does not deal with auctions at all.

The degree to which those involved in negotiations really behave rationally – a prerequisite for the application of game theory – is an especially interesting question. Nalebuff and Brandenburger dedicate a complete section in *Co-opetition* to the topic of "Rationality and Irrationality". They believe, as most economists do, that the rationality of individuals is simply a question of the incentives which drive them. "Irrational" behavior is usually rational on second look too. You need only take the trouble to understand the incentive structure of the person involved. However, Herb Cohen determined: "As a matter of fact, a human being is motivated by his or her individual interests, but their ›rational decision making‹ normally embodies some degree of intuition, emotion, habituation, and arbitrariness" (Cohen, 2003). Regardless, the important matter in the context of auctions is how understanding and considering the rationality of the bidder is an important challenge critical for the success both for the bidder and for the holder of an auction. At the same time, each side of the bargaining table benefits when the other side is also familiar with game theory relationships and norms. A widespread misunderstanding in this context is the idea that buyers and sellers apply the methods of game theory as they would an arsenal of weapons. This idea leads to the incorrect notion that if only one party applied game theory methods it would be at an advantage and that if both parties do it, the result would be a stalemate. But in fact if only one side of a negotiation applies game theory the results are rather uncertain. For example, when a purchasing department holds a competitive auction using game theory rules, then this auction will only provide the expected, optimum result when the suppliers also behave optimally. The best situation is one in which the sellers also use game theory. Then they optimize their strategy not against the buyer, but against their competitors instead. This in turn is in line with the goal of the buyer.

The structure of this book

Part I covers the most important negotiation and auction forms classified according to game theory. Negotiators should note that sooner or later they will have to decide whether they want to reach an agreement with their counterparts purely bilaterally or whether they want to present their counterparts with alternatives to induce them to compromise (this strategy is discussed as the "competition argument" in Section 1.1.). The example of a joint-venture negotiation between two automobile component suppliers will show that in principle these two methods cannot be reconciled. When negotiators decide whether to select a co-operative or intensively competitive negotiation style, they must primarily consider

the length and intensity of the contractual relationship going forward. While the stiff competition argument, that is holding an auction, produces a better negotiation result, it might be achieved at the price of undermining the mutual trust with the contractual partner.

Part II discusses the best bidder strategy for the respective negotiation and auction forms presented. The decisive term in this context is *strategic margin*. In first price auctions and exchanges of sealed bids, it is important for bidders to consider their own *risk aversion* and assessment of competition in their own offers. In second price auctions, which also include the English auction, it would be wrong for them on the other hand to integrate a strategic margin in their offers; the only thing offered here is the *indifference price*. Another influence on bidder behavior in the various auction forms relates to whether an auction item has *private value* or *common value*. In the first case, the indifference prices of the bidders remain unchanged during negotiations. In the second case, the bidders change their indifference prices when they learn the bids of their competitors to avoid *winner's curse*, for example.

Part III deals with auction design. Selection of the correct auction form is especially important for auctioneers. Overall, the generally known *dynamic English auction* has many disadvantages, which, in a professional context, are not in the interest of the auctioneer. For example, a lot of money goes unearned if one single bidder is willing to pay a lot more than all other bidders. In addition, it enables signaling games among the bidders or can provoke chaotic creation of prices depending on the decision-making structures on the bidder side. The theory provides numerous other auction forms, which have now been tried and tested in actual practice, which do much more justice to the rational initiation of business transactions including pricing. We will discuss the advantage of ticker auctions and combinations of these auction forms as "hybrid auction forms".

Finally, Part IV focuses on the two essential prerequisites for successfully applying game theory to negotiations and auctions: The adjustment of the competition argument using a bonus system and the strict maintenance of the commitment of decisions in price negotiations (or auctions). Many readers might wonder why these remarks are included here, but they are very necessary in the context of awarding contracts between companies. This book is designed to contribute to helping values such as fairness and commitment become more important again, especially against the background of the increasingly tough competition in most markets. Practical game theory experience shows that these are precisely the values which, in the long term, are paid back many times over.

Part I
Negotiation and Auction Forms

1
Bilateral Negotiations

1.1 The pie and the competition argument

Have you already bought something today? If yes, did you get a good buy? Are you certain?

Let's assume that you want to buy a used car today. You have been working on this plan for weeks and you are well prepared. You know the relevant value lists for the makes in question with respect to age and number of kilometers driven. You also know enough about cars to be able to assess wear and damages on sight and you know the highest price you are willing to pay. You find an ad on the Internet placed by a person selling a car which matches your search for a used car. He wants to sell for 20,000 euros. You inspect the car, take a test drive and decide that you are willing to pay no more than 18,000 euros. What you don't know: the seller paid 20,000 euros for the car two years ago and only drove 15,000 km since he bought it. Now he wants to try to get the same price again. But he really needs money urgently at the time and has been trying to sell the car for weeks. Consequently, he would also take 16,000 euros if he had to. But he would not accept less at this time.

That's the situation. The subsequent negotiation is intended to set a price acceptable to both sides. Apparently, any price between 16,000 euros and 18,000 euros is possible. Would you express your willingness to pay a maximum of 18,000 euros for the car? That would result immediately in a deal at 18,000 euros. Then you would have concluded a transaction which should be assessed neutrally from your viewpoint. Although you have the car you wanted, you had to pay your top price. You would have been happier about the purchase if you had been more successful at negotiating. The seller sees it completely differently. Although he was not able to get 20,000 euros, he did get 2,000 euros

more than his bottom price of 16,000 euros. That's not a bad negotiation result.

What happened here? Obviously, 18,000 euros is the price which represented the limit between a "good deal" and a "bad deal" for you.

Exactly at this price, your *indifference price*, you were indifferent whether you should buy the car. The indifference price of the seller was 16,000 euros, which you unfortunately could not have known. We will talk a lot about how difficult it often is to set this indifference price (your own and that of your negotiation partner) with sufficient commitment. Consequently, we want to assume for now that buyer and seller are at least certain what their own indifference prices are. Then it does not matter whether you buy a stick of butter, a used car or stock in a company as an investor. All of these transactions have one thing in common; transfer of property from seller to buyer only takes place if the indifference price of the seller is lower than that of the buyer (or at least both are the same). A transaction only ensues if the buyer valuates the item at least as much or more than the seller. If this is not the case, they can negotiate as long as they want to, but they will not reach an agreement.

Negotiation means sharing the pie

The spread between the indifference price of the seller and the indifference price of the buyer is called the *pie* of negotiations (see Figure 1.1). The dividing up of this pie represents the actual contents of negotiations. Every price between the two indifference prices is a possible negotiation result.[1] If the negotiations produce a result, then the spread between the final price and the indifference price of the seller is that part of the pie which the *buyer* can consider his negotiation success. He is pleased about the *purchase* and additionally for the amount he didn't pay. The spread between the indifference price of the seller and the final price is that part of the pie which the *seller* can consider his negotiation success. He is pleased about the *sale* and additionally received amount.

Against this background, it is clear why you should not express your willingness to pay 18,000 euros. This would be the same as giving the complete pie to the seller as a gift. Why should you go without your share of the pie? It is better to not disclose your limit of 18,000 euros at first and to put out a feeler when starting negotiations with a lower offer. As a result, you create a symmetric situation to the 20,000 euros of the seller and can then get closer to a price afterward.

Traditional "negotiation skills" are in the ability to give differing offers while staying as far as possible from your own indifference price.

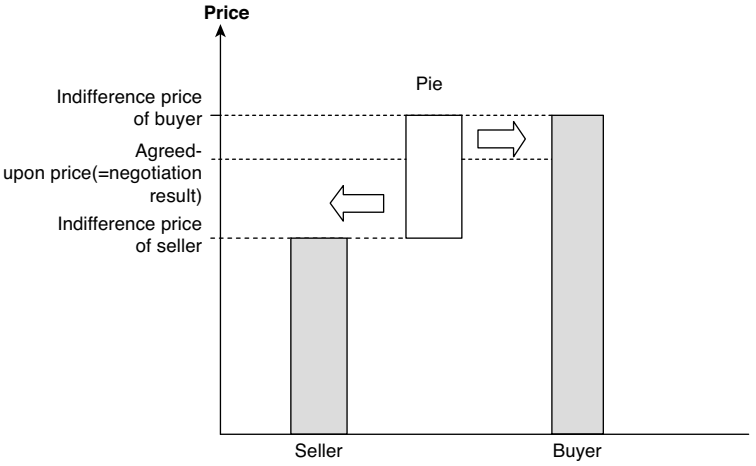

Figure 1.1 The "pie" in bilateral price negotiations and its possible split

Of course, these offers are accompanied by very different arguments. For example, you certainly named a few scratches, the dent on the fender and above all the film rust on the trunk lid. These arguments provide a clear advantage for someone who is familiar with car valuation and above all can explain this well.

This can impress laymen very much and put them at a disadvantage. But this does not change the fact that your indifference price is actually 18,000 euros (you already considered the scratches, dent and film rust in your calculation). These and other types of psychological arguments are certainly decisive for success in many negotiations. But it is not a question of the pure economic aspects of bargaining theory which we want to look at in this book. As already mentioned, only a combination of clever negotiation tactics and profound knowledge of the economic aspects of bargaining theory can ensure sustainable and repeatable negotiation success.

The strongest negotiation argument is the competition argument

Totally in line with the trend, a German corporation in the automobile component supplier industry considered relocating part of its production to Asia. In order not to take this risk alone, it conducted talks with an American competitor about a joint plant in China. Of course, negotiations about this joint venture were very complex. But if we reduce

the conditions to be agreed upon to the essential, then the item negotiated was also the dividing up of a pie here. The pie was essentially the added value generated by cost savings thanks to the joint venture. These were projected to be around 500 million euros per year. The two partners suited each other perfectly. The German company could not have reaped anywhere near as much added value with any other partner. The same applied to the American company. The German company assumed during the complete preparation phase of the joint venture that both partners would divide the pie in half. In an already advanced negotiation phase, the American company presented the following argument: They prepared an alternative joint venture with another partner parallel to the talks with the German company. Although this would only generate about 300 million euros per year, half was guaranteed the American company. Consequently, the pie to be negotiated was not 500 million euros, but really only 350 million euros. From the viewpoint of the American company, it would only be fair if the German company was satisfied without only 175 million euros.

The most important negotiation argument is this *competition argument*. By this we understand the option of one party to search out precisely one from several negotiation partners, with which it shares "the" pie. All other competitors get nothing. Giving individual negotiation partners the choice of being a bit flexible or possibly getting nothing is the pure form of the competition argument. In bilateral negotiations, the competition argument plays a more or less transparent but always static role.[2] But in an auction, the competition argument is played off against all alternative negotiation partners simultaneously. For example, this can take place as *simultaneous negotiations* with several alternative contractual partners, who sit in separate rooms and are visited one after another for individual discussions. If the competition argument is played consistently till the end in such simultaneous negotiations (a deal is struck in the end), then it is nothing other than a (more or less open or sealed) auction. We can speak about the inherent dynamics of using the competition argument in such simultaneous negotiations or auctions.

Before we talk about auctions in Chapter 2, however, we want to discuss the essential bilateral negotiation forms.

1.2 Meet halfway

Most people would call the result of bilateral negotiations as *just* or *fair* if the negotiation partners divide the pie into two equal parts.[3] A basic prerequisite for this is of course that both parties know the size of the

pie. This was the case in the already mentioned joint venture negotiations. Both parties opened their books in a spirit of partnership and calculated the joint project together. Both parties knew the added value to be generated. In spite of this, the American company demanded an asymmetrical distribution of the pie. How did that happen?

The concept of the *threat point* is behind this. The threat point denotes the scenario which is threatened if the negotiations fail. Negotiation theoreticians like to cite a coordinate system with the winnings of both parties from negotiations as coordinate axes. Each possible negotiation result is entered as a point in this coordinate system. The possible distributions of the pie create a line between the extreme cases of "one party gets the whole pie" and "the other party gets the whole pie". The threat point is an additionally possible negotiation result, which is not on this line. Both parties usually get nothing at the threat point. In complex negotiation situations, illustrating the scenario of the threat point can be rather illuminating. What does it mean exactly for both parties if negotiations fail?

The American company effectively shifted the threat point by establishing an alternative (see Figure 1.2). In fact, it does not get nothing if negotiations with the German company fail, but instead would then reap 150 million euros from the alternative joint venture. As a result, any division of the pie, in which the American company gets fewer than 150 million euros, is excluded. It would never agree, because the

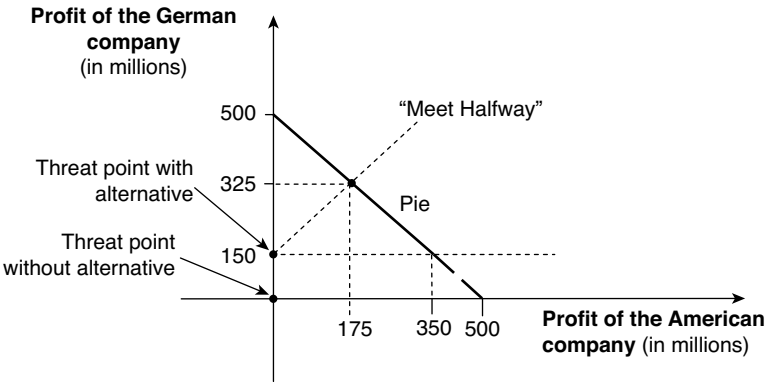

Figure 1.2 The "threat point" in bilateral negotiations (using the example of joint ventures of automobile component suppliers)

alternative would be better. Based on the coordinate system, we see that the shifting of the threat point means the same as considering a new, smaller pie. Granting the German company a share of 175 million euros means meeting halfway with respect to this new pie.

The competition argument is the most direct method for shifting the threat point in the direction of one's own profit. A more subtle strategy to achieve a better negotiation result is to shift the threat point in the direction of reduced profits for the negotiation partner. For example, this happens when it is possible to destroy the existing alternatives of the negotiation partner.

Why "meet halfway" at all?

A medium-sized company realized after it switched its cellular phone network service provider that it had misunderstood the confusingly formulated price model. For the approximately 100 employees, a monthly basic fee of 15 euros was charged as well as an additional monthly flat rate of 17 euros, which was the selected flat rate option. The company assumed when it signed the contract that the basic fee was contained in the amount cited in the flat rate option. After all, the basic fee alone amounted to a five-digit sum in one year. After the company refused to pay the basic fee, the cellular phone network service provider blocked use of the cellphone cards of the employees. But because a two-year contract was involved, it demanded a total of 36,000 euros in damages from the company. The positions became so inflexible that recourse to the courts would have soon become unavoidable. What would you do?

Legal disputes actually all have one thing in common; those who are most pleased are the lawyers, who really earn good money with them. Court and lawyer fees add up to become astronomical sums. The threat "I'll see you in court" can turn out to be rather expensive. At some point, there is no more pie to divide, because only the lawyers reap the added value. Of course, you can bet on winning the suit in the end and consequently not having to pay the costs. But the risk that you run is always there. It's not without reason that people say: "You are in God's hands on the high seas and in court." Consequently, reasonable people and rationally operating companies prefer to settle outside the courts even when they actually have very good chances in court. In our day, even law courts more and more encourage opposing parties to find out-of-court settlements. From a game-theoretical point of view, however, this has to be reflected carefully. Besides all obvious advantages in each concrete case, nothing less than the commitment of the whole system of justice becomes debatable. We don't want to go deeper into the matter

here because we want to focus on price negotiations, but we refer to the analogy in Chapter 9 where the aspect of commitment in price negotiations is discussed.

From a bargaining theory viewpoint, the situation of a single case with steadily rising attorney's fees and the ongoing risk still to lose the process at all corresponds to a pie that becomes smaller with time. The longer the negotiations last, the less remains in the end. Consequently, there is an incentive for both negotiation partners to reach an agreement as soon as possible. In this situation, for example, the "fair halfway" was quickly reached as a solution.[4]

The mentioned cellular phone network service provider and the medium-sized company agreed to this. The company preferred to pay 18,000 euros than to run the risk of higher legal costs. This compromise settlement was also interesting for the cellular phone network service provider, although it felt very certain that it could win the suit. But if it had lost the suit, then all of its cellular phone network contracts would have been contestable. The form of the threat point was very much in the negative given the possible danger. Even if it considered this danger to be slight, it did not want to take a chance with this threat point.

Lack of information makes reaching a fair solution more difficult

However, the solution of meeting halfway often fails in actual practice, because the size of the pie, or the indifference price of the opponent in the case of seller and buyer, is usually not known.

Negotiation processes mainly deal with getting a result despite incomplete or asymmetric information. In negotiation behavior seminars, the rule of thumb is taught that "whoever first names a price loses". Such statements cannot really be supported by bargaining theory. It is a question of which price you name when you make the start. But a possible theoretical explanation for the cited rule of thumb is that you actually lose when you name a price which is close to your own indifference price, and when you name a price that is far from it. In the first case, the probability is very high that you only get a small piece of the pie. You will never learn in this case how big the pie really is. In the other case, negotiations can easily break down, because the demand was simply inappropriate. Or you lose due to inappropriate credibility, which can also be very harmful in the further course of negotiations.

In the following section, we discuss a systematic method about how you can agree on meeting at a fair point halfway despite lack of information about the size of the pie.

1.3 The sealed exchange of bids

Two friends are sitting in a beer garden and discover that they both played the same sport when they were young. Both grew up near a lake and loved sailing dinghies. But while Jan's dinghy has remained untouched in a barn for years, Karl's old boat has been unusable for some time. He would like to buy a used dinghy again. That seems to fit, because Jan has been thinking for some time about whether he should finally get rid of his.

Both of them have no idea what a fair price for a dinghy is. Karl knows that new boats of this type cost approximately 6,000 euros. Used boats of this type cost between 1,000 euros and 2,000 euros. But Jan's dinghy is already more than 30 years old. It could have very different defects from damaged paint spots to leaks. Any price is too high if it is in a very poor condition. Jan assures that the dinghy has been maintained perfectly and above all has been stored properly and kept dry. Another difficulty is that the barn with the dinghy is about a one-hour drive from the city. Both friends would like to make a fair deal, in which neither takes advantage of the other. Both of them only want to drive to the barn if they are convinced that the deal will really be made. Consequently, they have no choice but to negotiation a price on the spot in the beer garden. Of course, that is like bidding for a "pig in a poke" for Karl. He does not have any information about Jan's indifference price. He doesn't have any assured information about the boat's condition (Jan has not inspected it for years either), which he could use for his own indifference price.

The sealed exchange of bids generates information

Both friends agree that they want to meet halfway with the given indifference prices. But the indifference prices are not known. In this situation, only an exchange of information can result in getting closer to a deal. Do you remember the rule that "whoever first names a price loses"? Despite their friendship, both friends observe this rule and neither wants to start negotiations. Between friends, a solution is often easily found in such a situation; an offer is written down by each and then exchanged.

Both friends agree to *exchange sealed bids*[5]. Both write down their idea of a price simultaneously and without letting the other see it. The notes are not exchanged, but instead both notes are then given to a neutral, third person, Markus. Markus knows the procedure of sealed exchange of bids precisely and makes certain that every detail is observed. First, only he may see the two prices. He checks whether the prices written

down *intersect*. The price written down by Jan must be lower than (or the same as) Karl's. Markus only discloses both prices if this condition is fulfilled. The rules of this method dictate that the middle of both prices is accepted as negotiation result. But if Markus determines that the prices do not intersect, then the procedure ends. Two rules apply in this case, which must be observed strictly. First, the prices written down are never disclosed, and second, the two friends accept the fact that the negotiation has failed. This transaction may never be mentioned again.

What is the purpose of this complex procedure? If a strict end of negotiations is not agreed upon in the case of non-intersecting prices, then an outlandish offer provides an advantage for both parties. The procedure is reduced to absurdity. Only a strict break off of negotiations when prices do not intersect causes both parties to consider their real indifference prices seriously when they submit their offers.

If the prices do not intersect by only a slight margin, there is substantial temptation to reach an agreement anyway. They could also meet halfway in this case, but now coming from the other side. If this option exists, both bidders consider it in their calculations and it waters down their bidding strategy. Non-intersecting prices are consistently not disclosed to prevent this. The third, neutral person is important for this case. Because you do not know beforehand whether this case will occur, the third person (the "trust center") is indispensable from the start.

But sealed exchange of bids is not a cure-all

Sealed exchange of bids is a simple and fair method to exchange information about the respective indifference prices if you want to meet halfway in any case. But it is very difficult to get a "bargain" or achieve an especially one-sided negotiation success with sealed exchange of bids. Consequently, sealed exchange of bids is not recommended for company purchasing procedures, because cost savings thanks to negotiation success are the top priority of purchasing. Only those who practice the idea of fairness and can afford such an investment in relations to contractual partners will find the result of sealed exchange of bids attractive and accept them.

The two friends Jan and Karl had no pleasure in the sealed exchange of bids either. Markus only told them that the prices did not intersect. They still do not know today which price the other wrote down in the beer garden. Apparently, Jan's valuation of his well-maintained boat was higher than the risk which Karl wanted to take, that is, to pay too much for a possibly damaged boat. In fact, not only the indifference price of the other was unknown, but above all Karl was unsure with respect to

his own indifference price. In this situation, a sealed exchange of bids alone is not a satisfactory method. It cannot replace a proper valuation of the item to be sold. Both friends would have done a lot better to drive to the barn with the dinghy and exchange sealed offers there.

1.4 "I cut – you choose"

We have only considered monetary "pies" till now, which were to be divided among two parties. Monetary pies have the quality that each euro is as good as another. In the division of a monetary pie, it is sole a question of the size of the two pieces. But real pies are also divided up in actual practice. This entails an additional challenge.

Susanne and Konrad meet in the late afternoon in a café. Both have a craving for rich iced chocolate cake. Unfortunately, only one piece is left and the next pastry shop is quite a distance away. They have no choice but to share the one piece. Impassioned negotiations start immediately about whether it would be better to cut the cake lengthwise or crosswise. Both really like the taste of the thick crust at the wide end. A cherry is near it, which Susanne would also like to have. Then she remembers an old principle: "I cut – you choose". Konrad has the right to cut the piece into two. Because he knows that Susanne can then choose her half, he cuts the piece as evenly as possible. Susanne chooses the smaller piece with the cherry and the thick crust at the end, and both are satisfied with the result.

We classify this principle in the world of bilateral negotiations. Actually Susanne and Konrad had already agreed to meet halfway. The remaining problem was that the piece of cake could not be divided very easily into two equal pieces. This was complicated further by the fact that not all areas of the piece were of equal value. The piece of cake must be understood as a *non-monetary quantity with inhomogeneous valuation*. Even if all information about this valuation is known to both negotiation partners, it is not that easy to find a fair cut. The principle "I cut – you choose" solves this problem in a rather just way.[6]

"I cut – you choose" in messy divorces [7]

In actual practice, problems dividing up non-monetary quantities with inhomogeneous valuation occur often. Consider the example of the negotiations for the shared property of a couple applying for divorce; we'll call them Manfred and Frauke. If they have joint ownership of property, it is split in half after the divorce. Everything is clear and unambiguous until this point; they meet "halfway" as mandated by

law. But only when it is a question of the explicit division of property do negotiations really get underway. House, car, boat, and so on are valuated differently, and there are different historical rights. Now the "I cut – you choose" principle can be applied as follows: Manfred defines two equal portions of the property from his viewpoint (see Figure 1.3). Normally, there are difficulties in creating two equally large packages, because certain items cannot be split. In this case, he defines a financial compensation payment. The packages are filled up with a debit or credit note. The sum of the divided notes must equal zero (i.e., the credit note in one package is as large as the debit note in another package). The individual packages are of equal value with the help of the notes – from Manfred's valuation viewpoint. Now Frauke can select one of the two packages and apply her own valuation of the items. Manfred gets the other package. Because he made two equal packages from his viewpoint, he cannot complain in any case. Based on the allocated debit and credit notes, compensation payments are set between the two. For example, if the house is worth a lot more than half of the total wealth, then it can only be one of the packages with a large debit note. If neither Frauke nor Manfred is able to pay this debit note, then the house must obviously be sold.

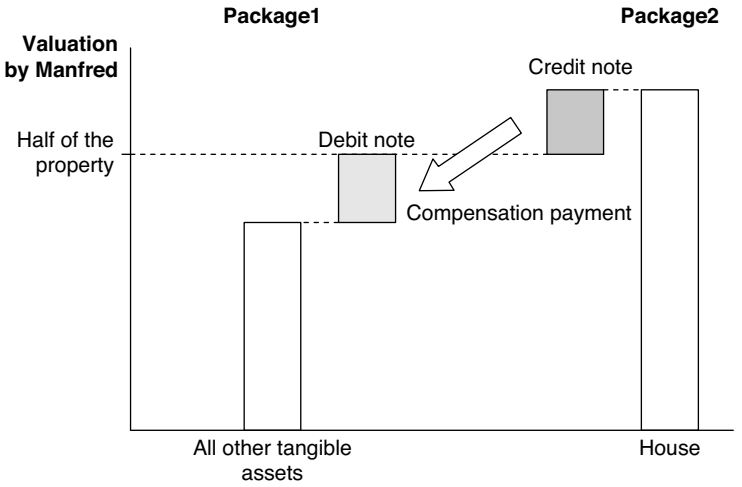

Figure 1.3 Making a package for "I cut – you choose" (using the example of dividing up property after a divorce)

The question of who puts the packages together and who make the choice is of course already an item of negotiation. If the two parties valuate differently, it can be a slight advantage to be able to choose. One of the halves will most probably be better than the other from the viewpoint of the person choosing. But the person dividing the property cannot complain, because he had the power to define two equal halves from his viewpoint. Let's look at the case of Manfred and Frauke; both of them are basically interested in the house. Then the valuation of the house by the person dividing the assets will be so high, that he would be content with a compensation payment. But the valuation will not be that high either, because he might have to make the compensation payment. As a result of the principle, the person dividing the assets must make a fair valuation. The compensation payment would be just high enough that Manfred is indifferent to the question of whether Frauke takes the house or leaves it for him.

1.5 Negotiation judo

A production plant is planning to contract a software company to carry out several IT projects. The two parties negotiate a framework agreement to set the general terms and conditions, which become a component of the contract automatically at each order. The framework agreement does not contain daily rates for fixed prices yet. This is done individually for each individual project. On the other hand, the following topics are set in the framework agreement:

- Travel expenses provision
- Documentation standard
- Quality assurance process
- Liability conditions
- Payment terms.

The individual topics of the framework agreement differ in their importance and expense for the two negotiation partners. Totally in line with the Harvard concept[8], the production plant and the software company promoted their own interests in the negotiations, whereby they of course were willing to make concessions for one topic if the same was granted for another. However, the negotiation partners did not know the extent to which a topic was really important for the other party. This lack of information provided a chance to use a negotiation tactic which is called *negotiation judo*.

Interests are either "must-haves" or "tradables"

Strict liability conditions were important for the production plant. If an error by the software company caused damages (e.g., shut down of the production line), the software company should compensate for losses. An annual upper limit of 10 million euros for damages should apply. The liability conditions were also supposed to be an incentive for the software company to pay attention to appropriate quality. The liability conditions were a *must-have* for the production plant. On the other hand, the production plant did not consider the travel expenses provision as really important. The developers in the software company were supposed to work in their offices most of the time, so that a great deal of travel was not expected for the order of the production plant. As a result, the travel expenses provisions were a *tradable* for the production plant.

The topic of the liability conditions or a less strict version of them was immensely important for the software company. The liability conditions could threaten the existence of the software company in a worst case scenario even if the probability of such a case was slight. On the other hand, the travel expenses provision meant cash for the software company. But it could not estimate how much travel there would actually be to the sites of the production plant. The interests of the two negotiation partners are summarized in Figure 1.4.

Interest of the software company			Topics of	Interests for the production plant		
Must have	Tradable	Inclination		Inclination	Tradable	Must have
	x	Generous	travel expenses provision	Thrifty	x	
	x	Low	documentation standard	high		x
x		Intensive	quality assurance process	Intensive		x
x		Mild	liability conditions	Strict		x
	x	Prompt	payment	Late	x	

Figure 1.4 Real interests of two negotiation partners (using the example of a framework agreement for IT projects)

Who do you think can promote its interests better? At first glance, the production plant has a worse starting position. It had three must-haves, which it wanted in any case, while the software company was only inflexible with respect to two must-haves. But we will see that this calculation of must-haves is too simple to predict the negotiation result. In fact, the production plant was able to have all of its demands met, the high documentation standard, intensive quality assurance process and the strict liability conditions. How was that possible?

Let's start the discussion with the following observation: the interests of the negotiation partners were not opposed in all topics. In fact, both sides wanted a more intensive quality assurance process. The negotiation about this topic was really a lot of fun. Both sides agreed that high quality had to be assured and the associated quality assurance process generated a classic win-win situation. Both parties split the expenses for quality assurance equally. Against this background, an agreement about a relatively complex quality assurance process was reached relatively quickly. This had a certain influence on the topic of liability conditions. The better quality was assured, the less probable was the case of damages in which the liability conditions would apply. Both sides of the bargaining table considered this fact. A stalemate was reached for the moment, which was rather critical for constructive negotiations: Both parties declared a contradictory interest as a must-have. This situation can also result in a breakdown of negotiations. I have often seen framework agreements in actual practice which were not signed precisely for this reason for months or years. Usually, it is actually some liability clause that results in a stalemate of negotiations. In spite of this, a few initial project orders are often given, which does not necessarily make the negotiations for the framework agreement easier.

Information plays a decisive role

In the case above, the production plant was able to save the situation using *negotiation judo*. When the topic of travel expenses provisions was discussed, the plant did not disclose its assessment of the few trips within the framework of the IT projects. When the software company presented its initial demand for generous travel expenses provisions (1st class train tickets, flights in business class, etc.), it rejected them strongly and consequently moved the perception of its interests in thrifty travel expenses provisions consciously in the direction of must-have, even though they were not actually so. You would certainly do the same intuitively. At this point, from a bargaining theory viewpoint, this is what happened: The production plant kept the valuation of

the travel expenses provisions artificially high. As a result, it created a counterweight which it could actually use in the negotiations about the liability conditions. The software company finally offered to sign the liability clause if the production plant would accept the generous travel expenses provisions. The acceptance of this offer reminds one of a characteristic tactic in the sport of judo, in which you suddenly remove resistance to the built-up pressure of the opponent and use it to your own advantage. The demand of the software company for generous travel expenses provisions was something that the production plant could easily afford. But by using this judo tactic, it got the signature on its liability clause. In fact, the amount of travel was an unknown dimension for the production plant, which it could only estimate. Consequently, it agreed in the same vein to an easily acceptable payment term with the software company.

Negotiation judo only works with asymmetric information

The software company tried unsuccessfully to use the same tactic for the topic of documentation standard. It was clear that a high documentation standard would be a must-have for the customer, because software cannot be maintained without appropriate documentation and can result in problems in the long term that outweigh the benefits. Consequently, the production plant was dependent on appropriate documentation. At first glance, we believed that this could result in a weaker negotiation position for the production plant. But appropriate documentation was only a question of the work for the software company, which was to be invoiced at any rate. What could the software company give as reasons against detailed documentation?

The answer is: nothing. To the contrary, both parties knew that insufficient documentation of the software could result in dependence of the production plant on the software company. Consequently, it would have been more attractive for the software company to avoid the obligation of a document standard. But to present a low documentation standard as a must-have was not possible against this background. The production plant had rejected a business relation in this respect on principle. As a result, the software company could not play negotiation judo with the topic of documentation standard and sell it for a lot of money. Another more far-reaching reason was that both sides were conscious of the importance and the motivation of the opponent with respect to this topic. Negotiation judo means to feign a must-have to your opponent in order to sell it for more than it is actually worth. Of course, that only works if both sides have different information about the value of a

topic. This prerequisite was not fulfilled for the topic of documentation standard.

In the last four sections, we discussed the various negotiation situations (negotiations about monetary pies or non-monetary quantities or interests, each time with complete or asymmetric information) and the associated, appropriate negotiation forms. The following section considers a tactic which can actually be used in each of these situations and which plays a very important role in negotiating practice.

1.6 The ultimatum game

At the beginning of this book, I asked you whether you already bought something today. If your answer to this question was "yes", there is a good probability that you took part in an *ultimatum game*. Were you aware of that?

Let's assume that you want to buy a half-pound of butter in a supermarket today. The price tag says 1.45 euros. You only have two options. Either you buy the butter or you don't buy it. In the first case, you accept the price, and you don't accept it in the second case. Then this transaction will never be mentioned again; you will have forgotten this butter seconds later.

The negotiation situation in a supermarket is what we call an ultimatum game. The supermarket presents you with a price ultimatum: Either you accept the price or you don't. The character of the ultimatum game is that the price cannot be negotiated further. Consequently, you will not be able to find a willing listener in the supermarket manager if you want to negotiate the butter price, regardless of whether a discount law applies.

What actually happens here? We learned that a bilateral price negotiation is always to be understood as dividing up a pie in pieces between the indifference prices of the seller and buyer. We do not know the indifference price of a supermarket for a stick of butter. Consequently, we are in the situation of a lack of information in dividing up a monetary pie. In the example of the two friends, who actually want to meet halfway, we saw that this situation results in a stalemate. Remember the rule that "whoever first names a price loses"? Isn't the supermarket violating precisely this rule with its price tag? Isn't it losing its just share of the pie because of this?

The opposite is the case. The small but decisive difference between a simple "first name a price" and an ultimatum game is the extra fact that the latter deals with just that, that is, an ultimatum.

An asymmetric situation is created simply by that, where previously there might have been a completely symmetric stalemate situation. Of course, this only makes sense for the person making the ultimatum if he receives a benefit with the cited price. Consequently, you can always assume that you always get the smaller piece of the pie if you accept an ultimatum. However, there is always the alternative in an ultimatum game that the negotiations break down and that you do not get any part of this pie. Then you have to buy the butter somewhere else.[9]

The only remedy is the competition argument

If you really buy the butter somewhere else and then simply cross the street, it can happen that the butter also costs 1.45 euros there. If this is the case, then you can assume that the supermarket manager already crossed the street once that morning. In this case, he knows your indifference price which results from your alternative. He can confidently cut out the biggest possible piece of the pie with his ultimatum. The supermarket manager knows the market well in any case and consequently has a good feeling for your indifference price. This is determined not only by the price in the store across the way, but above all by all alternatives, which might be a few minutes away by car, and is determined in the end by the general elasticity of demand (the reaction of demand to changes in price) for butter. Let the supermarket manager feel your active price comparison. If he sells noticeably less butter, he will correct the price downward. The price is set in a larger market context here. Consequently, you will always have the impression in individual bilateral negotiation situations when purchasing a stick of butter that you accept a price close to your own indifference price.[10]

What works for butter can be applied in the same way in almost all negotiation situations. The size of the pie in question plays no role. For example, take the joint venture negotiation of the two automobile component suppliers, who wanted to meet halfway. After the American company had put forward its competition argument, it was already looking forward to a share of 325 million euros of the 500 million euro large pie. For the German company, however, the enthusiasm for the project diminished substantially for understandable reasons and the relationship of mutual trust with this partner was somewhat disturbed. Against this background, it gave a *TIOLI* ("*Take it or leave it*") ultimatum: Either the American company would accept 200 million euros (which is substantially more than the presented alternative, which would give them 150 million euros) or the Germans would withdraw from the project. They explained this ultimatum to their own owners with the

reasoning of a higher estimation of risk of a partnership with a partner with reduced trustworthiness. The Americans were visibly impressed, but they understood the language. Not only that they accepted this offer, but also further discussions with the German partner were suddenly held at the eye-to-eye level again.

The credibility of the ultimatum is essential

TIOLI is simply another word for the ultimatum game; it means exactly the same. As we saw in the case of the joint venture negotiation, it also works when the information about the pie is available completely. In a certain sense, it makes the competition argument superfluous if only sufficient credibility is behind an ultimatum. However, if negotiations are continued as previously after a TIOLI has been expressed, then it becomes a completely normal offer and credibility is destroyed. In actual practice, the line between a hard TIOLI and a more or less hard "final offer" is fuzzy. You can only achieve really great results with a TIOLI if you have established a credible reputation of no longer negotiating after a TIOLI has been rejected. Of course, the competition argument helps in this. If your counterpart knows that you have an alternative, the credibility of a hard TIOLI increases. But very different factors can also contribute to making a TIOLI credible. In the case of the German automobile component supplier, the description of an erosion of trust made a breakdown of negotiations seem credible. In the case of butter in a supermarket, whether the supermarket manager feels like negotiating with you about a stick of butter is not at all dependent on the actual relation between supply and demand. You can always assume that the price tag on a stick of butter stands for a genuine TIOLI, regardless of whether it is in tune with the market price.

The ultimatum game also works in negotiations about non-monetary pies or interests. Negotiations between a hostage-taker and the police, for example, are essentially characterized by the giving of certain ultimatums, which are then carried out or not. In this context, the question of negotiation power is reduced completely to the aspect of the credibility of the cited ultimatums. Consequently, the art of negotiation in this context is based essentially in giving the hostage-taker the chance to ignore his own ultimatum without losing his credibility.

1.7 Summary

Bilateral negotiations are always a question of "pies". In them, the strongest negotiation argument is the competition argument; if a

negotiation partner has an alternative, this results in his getting a bigger share of pie. Meeting halfway is a negotiation form in the most general sense (theoreticians talk about a "cooperative negotiation solution"). As a prerequisite, both negotiation partners must know the size and valuation of the pie (i.e., in a situation with "complete information; see Figure 1.5). If it is not a question of a monetary pie, but instead of a quantity with inhomogeneous valuation, then "I cut – you choose" is an elegant method of finding a halfway point acceptable to both negotiation partners. Negotiation partners often do not know the size and valuation of the pie. In the case of a monetary pie, the sealed exchange of bids is then an efficient process to find a solution. In the case of non-monetary pie, the characteristics of which the negotiations partners do not know with certainly, negotiation judo is a possible negotiation tactic.

In all negotiation situations (monetary or non-monetary pies, the characteristics of which are known or not known), the ultimatum game, or TIOLI, can be applied. TIOLI is a method often used in actual practice to establish and take advantage of an asymmetry where there actually is no asymmetry.

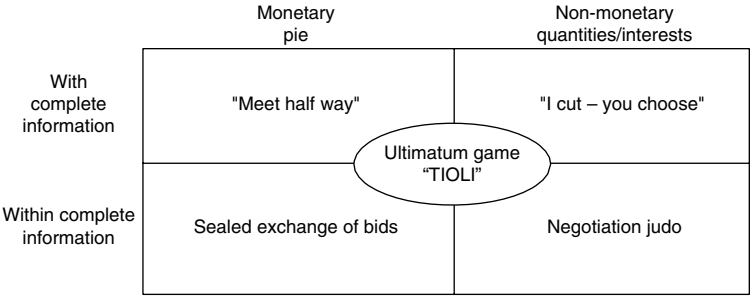

Figure 1.5 Overview of bilateral negotiation situations and respectively possible negotiation forms

2
Auctions

2.1 Sale and purchasing auctions – the differences

No doubt you are familiar with eBay. But are you also aware of quotatis.de or my-hammer.de? Individuals or even companies can announce their need for services there. Exactly as in eBay, those interested bid in an auction. However, this is a *purchasing auction*, that is, the winner of the auction provides a service and receives the offered price. The auctioneer[1] buys this service and pays the price determined by the auction. While the auctioneer wants to get the highest price possible in a *sale auction*, for example, at eBay, it is exactly the opposite in a purchasing auction. The auctioneer wants to pay the lowest price possible.

The following job description is from this service purchasing auction: "I am looking for competent Excel and VBA programmers for work on an Excel tool. Because the programming work to be performed is difficult to describe here, I will forego that. But only persons with good VBA knowledge should bid for the work." Starting from a price of 1,000 euros, there was lively bidding to a level under 500 euros. Would you have participated in the bidding?

The things that work on the Internet are really astounding. The work to be performed was almost not explained at all and a concrete price was given in spite of this. It was not even clear whether the offered price was a fixed price for the total work or instead meant as a daily rate, which would be paid accordingly. It is not surprising that individual communication, which takes place between bidders and auctioneer in such auctions, has immensely important significance. You can imagine that the auctioneer in our example was flooded with questions such as "Please describe your needs more precisely", "Please send me an example of the Excel file", and so on. The bidders have to take enormous

uncertainties into account here about what they are actually bidding for. Of course, this situation can also occur in sale auctions; the bidders are also dependent on the description of the item by the seller.

But in a purchasing auction, there are additional uncertainties for an auctioneer. Namely, he does not know what he is buying in the end. This uncertainty does not exist in a sale auction, because the auctioneer sells her/his goods there (regardless of whether property or service) and she/he is usually only concerned with the price. It is a question of *one and the same* item for all bidders. In a purchasing auction, on the other hand, not only the item is at stake, but every bidder also has her/his own goods that differ from that of other bidders. In the best of cases, there is talk of the s*ame item* of each bidder, whereby these might fulfill the needs of the auctioneer in varying degrees.

Are these "purchasing auctions" really auctions at all?

The technical functions of the cited Internet auction platforms and eBay are very similar. But they have one decisive difference due to the high degree of uncertainty for the auctioneer in a purchasing auction. While at the end of an auction in eBay, a binding purchase contract is concluded (between the individuals), the awarding of the contract at the end of an auction in quotatis or my-hammer remains open. The auctioneer has the free choice of to which of the bidders he awards the contract, each at his own price. He can also test several bidders one after another and only select one thereafter or even not award the contract. The bids of the bidders are legally valid and binding, but the auctioneer is free of any obligation. Consequently, this *bidding event* is not an auction in the strict sense of the term, because it lacks the prerequisite *of commitment* for the auctioneer.[2]

The market determines the direction of the auction.
But not always…

An interesting question is when does a sale auction take place and in which situations do those involved (auctioneers and bidders) prefer or accept a purchasing auction. The "market" answers this question in general, that is, the balance of power that exists for an item or service between sellers and bidders. If there are short offers and those with demand are in the majority, we talk about a *sellers' market*. The sellers have negotiation power on their side. In such a market, there are usually more sale auctions. On the other hand, if the sellers are in the majority and consequently there is competition for a sparse demand, we talk about a *buyers' market*. Purchasing auctions take place in this case, because purchasers are in power. That's the theory.

However, this rule does not seem to apply to Internet auctions open to everyone. If we consider the eBay copies[3], which seem to be sprouting like mushrooms, then we see that it is almost exclusively a question of sale auction platforms for material goods. The presented purchasing auction platforms are conspicuously not platforms for material goods, but instead for services. At first glance, this leads us to believe that markets for material goods on the Internet are sellers' markets and service markets are buyers' markets.[4] When we discuss the auction theory aspects of eBay later[5], we will see why eBay actually is very attractive for buyers although it is a sale auction. Knowledge of this aspect provides a decisive advantage to individual bidders. I would like to come straight to a point here, namely, that it is not the theoretical auction aspects that constitute and give the reason for the success of eBay.

In the world of business customer markets of goods that every company demands (office supplies, IT hard- and software, standard tools, diverse services and so on), mercateo.com has established itself as the leading online platform in Europe. This online marketplace functions as pure facilitator of business between producers and retailers (in particular those who for example run a physical warehouse and offer the respective logistics) on the supplier side and business clients on the demand side. The more comprehensive the demand on the platform is, the less any supplier can afford not to place his offerings there. And vice versa: The more comprehensive the offers on this platform are, the less any customer can afford not be informed about how well they match his demand and to possibly satisfy it on this platform. Finally, something evolves that is called the network-effect: As soon as the platform has exceeded a certain critical size, its growth is self-selling and it becomes extremely hard for competitors to withstand it. In this comfortable situation, mercateo.com has now introduced a shopping cart auction that gives every customer the opportunity to auction his demand via mouse click among suppliers on the platform (as procurement auction). The ulterior motive was to ensure an economically better and for both sides of the market fairer allocation of business relationships facilitated by one's own platform: Buyers may count on better prices with the shopping cart auction promising the lowest price. At the same time, by reducing prices, suppliers may generate directly more revenue. And yet, it will be interesting to observe if the effect will be the one aimed at: For most participants of the platform, both suppliers and customers, the tool is extremely in need of explanation and associating auction with "stress" they might react with reservations. Other tools like for example an automatic best price search machine in the big database of the platform are

more pragmatic and easier to understand. If it is not clear which side of the market is under pressure, auctions are not really what usual market participants sense as normal and are just willing to accept.

In the most far-reaching sense of the word, Amazon is also a platform of purchasing auctions. When you look for a book there, all current offers placed by sellers for new and used copies are displayed. The buyer looks for the best value for his money and buys the book. That reminds us a little of a purchasing auction, where the bidders do not take part actively in the negotiations, but instead each person has placed his offer in advance. Using the same argument, we can also understand preisvergleich.de as a kind of meta-purchasing auction platform.

The mirrored auction theory

You might ask how an auction fits with the terms about bilateral negotiations in the previous chapter. Essentially, one of the two negotiation parties discards the idea of meeting halfway and prefers to use the competition argument to achieve a result. The fact that the idea of meeting halfway and the competition argument cannot be combined was something that the American automobile component supplier discovered all too well in the described joint-venture negotiation.[6] After it divided up the pie to its advantage using the competition argument, it was no longer able to assert its demand for half of the remaining pie.[7]

That is exactly what happens in an auction, and indeed with all consequences. In a simultaneous negotiation with all competitors, the pie is divided up as much as possible to the advantage of the *auctioneer* (see Figure 2.1). The auctioneer is respectively the seller in a sale auction and the buyer in a purchasing auction. As *auction theory*, we will get to know various game types for simultaneous negotiations in the subsequent sections. In a certain sense, the auctioneer then leaves the rest of the pie for the winner at the end of an auction.

The complete auction theory can also be applied in precisely the same way both to the world of sales auctions ("forward auctions") and to the world of purchasing auctions ("reverse auctions"). A mathematician would say that the complete theory is only "mirrored" during transfer from one world to the other.

All auction forms which are possible as sales auctions can also be used as purchasing auctions and vice versa. To do this, increasing prices need only be replaced by decreasing prices and vice versa. For example, if an English auction sells in the sales world with the price increasing, then it sells in a purchasing auction with the price decreasing. The situation is the opposite with the Dutch auction; prices decrease in a sales auction

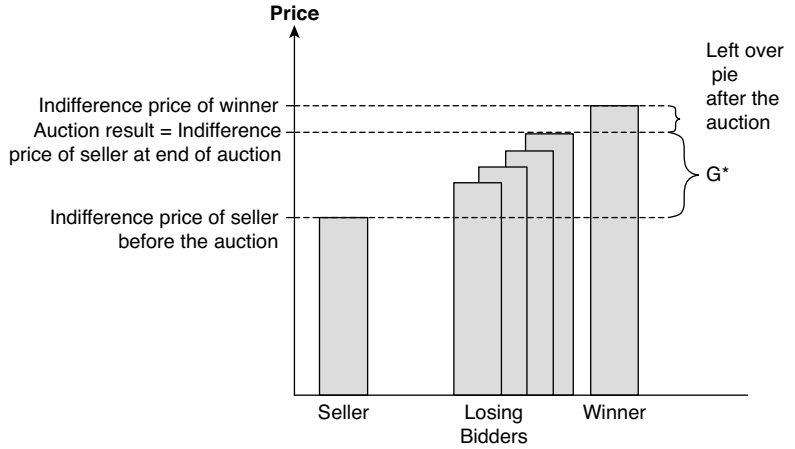

Figure 2.1 The redivision of the pie in a sales auction

and increase in a purchasing auction. These and other auction forms are described in more detail in the following sections.

2.2 The English auction

The business idea of eBay is already rather old. Already Sisi, the Empress of Austria, sold her superfluous items in an auction house to the highest bidders. This auction house, the Dorotheum in Vienna, still exists today. It is distinguished by its offer of relatively high-quality curios and woks of art. You can visit their website at dorotheum.at. The Dorotheum and eBay have one essential thing in common; the most important factor of success of an auction for both is its visibility, that is, how many bidders become aware of an item during the exhibition phase and become interested in it.

The more bidders take part in an auction after the exhibition phase, the more competition takes place and that much higher the achieved sales price.

The exhibition of an auction item in the showrooms of the Dorotheum or during the auction period at eBay on the Internet makes the item known to the largest possible group of people interested. The role of tradition art and antique auction houses such as Sotheby's or Christie's is very similar. The owner of an old, established auction house in Stuttgart

expressed his assessment to me that the Internet is making "bargain hunting" in individual, traditional auction houses increasingly difficult. Because practically all auction houses today announce their offers on the Internet[8], the markets are becoming increasingly large. In the case of art and antique markets, this is happening to the detriment of those interested in buying. Although they can find certain items they desire faster, they are normally by far not the only ones interested in them.

Design of auction dynamics has very different forms

In all of these auctions with an open circle of bidders, the pure marketing aspect of the exhibition phase is probably more important for the auctioneer than various auction theory aspects of the auction form. In spite of this, we should not overlook the fact that the auction form also influences the result, which we should be aware of. Conventional auction houses such as Sotheby's, Christie's and even the Dorotheum use the most well-known auction form, the *dynamic English auction*, what you might think of as the epitome of an auction. Starting from an initial offer, the time is counted until a bidder submits a higher bid than the current one. The time is counted anew with each newly submitted bid. If no bidder submits a higher bit, the (symbolic) hammer falls after the counted time expires and the bidder with the last, highest bid has purchased the item. In actual practice, questions such as the following are interesting at this point: How is the start of the auction designed precisely? How long is the time precisely, which is counted each time, until the hammer falls? Does a new bid have to exceed the current one by a minimum price increment? Can a new bid be higher in any amount? Can any value be submitted for a bid, for example, with a lot of decimals (in Internet auctions)? Can I observe the other bidders and – if not – what information do I get about the bids of other bidders?

All these are questions of the *design of auction dynamics*, for which the different auction houses and auctioneers have different rules. Certain conventions have become established in conventional auction houses over decades, which are applied very similarly almost everywhere. For example, this includes the proverbial saying "Going once – going twice – sold" before the sale is finalized at the end of an auction.

Since the victory march of the Internet, it has become normal for sufficiently large companies and corporations to use the negotiation power of purchasing for holding purchasing auctions in the awarding of contracts. Completely different, novel design of auction dynamics have become established for these events with closed groups of bidders.[9] These purchasing auctions usually take place on Internet platforms

established specifically for this. For example, individual bidders can see either the current bids of all other bidders on the Internet, only the best bid, or only the ranking, that their respective bids have. They often only see so-called traffic lights, that is, one of the colors red, yellow or green. In this, the ranking derived from a color provides less information. A bidder often does not know whether "green" means the same as "1st place" or whether several bidders with similar bids could not have "green" at the same time. In addition to this information game, the activity rules can also differ. Does a new bid have to have a minimum price increment? For example, a bidder can often improve his own bid even if he does not make a currently best offer with it.

These auction dynamics designs, which often take some getting used to, especially the *ranking* and *traffic light auctions*, are often held in actual practice in connection with the lack of commitment of the auctioneer.[10] A diametrically opposed philosophy of design of auction dynamics is not to permit any dynamics among bidders. In this English auction "without inherent dynamism", the bidders are not requested to submit bids, but are also asked who is willing to confirm certain bid prices called out by the auctioneer. The auctioneer raises the price until only one last bidder confirms, who then wins the auction. This *English ticker auction* is gradually becoming established in the context of the awarding of orders between companies as a form of one of the most binding purchasing auctions. We will discuss the multifaceted advantages of the English ticker auction, especially compared to the dynamic English auction later.[11]

The English auction always provides only the second-best price

Theoreticians think that the design of the auction dynamics has a marginal but distorting influence on the result of an English auction. The person with the highest indifference price always wins the auction in the end. The bidder with the highest indifference price must outbid that person with the second-highest indifference price, that is, the price is defined by the second-highest bidder. The design of auction dynamics only influences whether the price at the end is a smaller or larger minimum increment above the second-highest bid or whether the highest bidder by chance selected a smaller or larger higher bid. In each case, however, it is the second-highest bidder who forced up the price (see Figure 2.2). Consequently, the English auction belongs to the class of *second-price auctions*.

Please reflect on this fact once again. Whenever you hear about a new record price at an auction, for example, the historically highest collector's

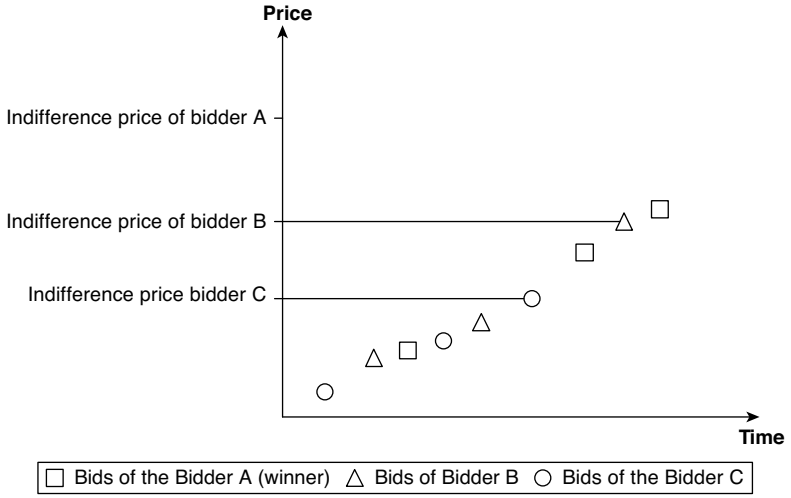

Figure 2.2 Sequence of events of a dynamic English auction

price just paid for a painting at Sotheby's, and so on, then the winner was theoretically willing in any case to pay even more. The actual indifference price of the winner after an English auction will always remain his secret.[12] If the indifference price of the winner is not reached by the second-highest bidder, the English auction seems to have missed a chance to take in more money from the viewpoint of the auctioneer.

2.3 The second-price-sealed-bid auction (Vickrey auction)

The official awarding of cellular phone network licenses in New Zealand in 1990 created a lot of difficulties for the telecommunications minister responsible for this.

While the cellular phone network license auctions reaped amounts in the billions for government coffers and attracted attention everywhere, the New Zealand minister was accused of squandering tax money. What happened?

In New Zealand, a simultaneous number of second-price-sealed-bid auctions for different frequency bandwidths were selected. All bidders could submit bids for individual frequency bandwidths. The bidder with the highest bid got the individual frequency bandwidth. Everything

corresponded to a conventional call for bids to this extent. But the special rules of second-price-sealed-bid auctions dictate that the purchaser of a frequency bandwidth did not have to pay the price he bid himself, but instead only that the second-highest bid submitted. Admittedly, this rule seems somewhat strange at first glance. This auction form was first analyzed by William Spencer Vickrey in 1961, who provided the incentive for a lot of further research and numerous publications with it, the total of which are called auction theory today.[13]

The second-price-sealed-bid auction is related to the English auction; the highest bidder wins at a price that the second-best bidder essentially determined. The difference is that the bidders in an English auction know the bids of the others or – depending on the design of auction dynamics – get more or less information about the bids of the other bidders. Bidding in an English auction means processing received information to submit a new bid. In a second-price-sealed-bid auction, the bidders do not obtain any information, that is, they can only set their bids alone and learn afterward whether they won or not.[14]

The second-price-sealed-bid auction is a successful model

Have you already placed your advertising in Google Adwords? If you enter any term as a search term in Google, you will also see a column on the right with paid advertising which calls attention to the search term.

If you click on one of these advertisings, you are routed directly to the website of the concerning supplier and he has to pay Google for the single click of a person interested at the same time. When you read in the newspaper about the exorbitant profits of Google, then you should know that approximately 98 percent of Google's revenue in 2005 (we are talking about more than six billion US dollars) come from the click fees from the Google Adwords advertisements, for example. Each of these individual click fees is the result of a second-price-sealed-bid auction.

To place an ad, you have to state your maximum willingness to pay for one single click. The supplier, who wants to place an ad, has complete leeway with respect to the amount he states. The ad and the stated amount refer respectively to one single search term; the same game often takes place parallel for various search terms any number of times. When an Internet user searches for the term in Google, then the ad with the highest willingness to pay per click is placed at the best spot at the top of the column with ads. If somebody then actually clicks this ad, the supplier need only pay the amount that the supplier with the second-highest willingness to pay stated. As a result, the willingness to pay

corresponds to a bid in a second-price-sealed-bid auction held among suppliers for the best spot in the ad column. If we examine it more closely, the game at Google goes even further, because the following places in the ad column are also allotted and valuated in line with this logic. If the ad in the second place is clicked, the corresponding supplier pays the bid of the third person, who in turn pays the bid of the fourth person at each click, and so on.[15] You will certainly accept the commercial success of Google as proof that the idea of a second-price-sealed-bid auction is not a bad thing in general. But it was a very bad idea in the case of the cellular phone network license auction in New Zealand. In a few of the second-price-sealed-bid auctions for the various frequency bandwidths there, there was only one serious offer and the second-highest bid was already at an unrealistically low level. The frequency bandwidths in question were almost given away, which could not be hidden from the public and created a lot of headaches for those responsible. You are never safe from this danger in a second-price-sealed-bid auction. If the difference between the two highest bids is very high, you had better have some good arguments as an auctioneer to justify the results.[16]

2.4 The first-price-sealed-bid auction

When the government awards contracts, it is usually a question of millions of euros. Construction contracts for roads or schools, administration buildings, IT infrastructure for public agencies, military contracts and so on are only a few of the innumerable examples of suspenseful contract awards to private enterprise. Because it is nothing other than a question of our painfully paid taxes, it is reasonable that these government contract awards are subject to strict regulations, *public procurement law*. A government agency awarding a contract cannot simple select a supplier according to its own "entrepreneurial freedom" in the same way as a private company. Instead, procurement law stipulates precisely how the respective negotiation and decision-making process should be structured. You can certainly well imagine that this law is a work that fills many books. Complete law firms have specialized solely in supporting public agencies awarding contracts in preparing contract awards in line with the law or in representing losing bidders in contesting contracts awarded not in line with regulations.

Public procurement law recognizes one negotiation form which is prescribed for most public contract awards in all guidelines, special regulations and any exceptional cases: a *call for bids*. A call for bids denotes

the procedure of obtaining an offer from each supplier and to award the contract to the best supplier, that is, the one with the *"most cost-effective bid"*. Of course, numerous additional aspects also play a role which I will not deal with in more detail here.[17]

For the time being, only the fact is interesting that the procedure of "calling for bids" in line with procurement law corresponds to a *first-price-sealed-bid auction* as a purchasing auction from the viewpoint of auction theory. This is distinguished by the fact that (as a sale auction) all bidders submit precisely one bid; the best one obtains the auction item and pays the bid price.

First-price-sealed-bid auctions are rather rare in free enterprise

If a private company carries out such a procedure on the purchasing side, then it reminds us of a completely normal round of offers without the absolute necessity to conclude a contract directly afterward. Instead, never-ending subsequent negotiations can be expected based on customary negotiation practice. As a result, very few bidders are willing, for example, to submit their best offer in a first-price-sealed-bid auction on an Internet platform. To be taken seriously as a real auction including contract signing, a (private enterprise) first-price-sealed-bid auction must be held in the following form: The bidders are in a room and see the auctioneer at the opening of the bids. The auctioneer only discloses the respective price of all bids, that is, the bidders do not know from which competitor which price comes. But each bidder knows his own price and understands precisely whether he wins the auction with it.

The bidder with the best bid goes home from this event with a contract. In my work as auctioneer, I have held numerous first-price-sealed-bid auctions for private entrepreneurs exactly in this way.

Using this procedure, a contractor not subject to procurement law can also ensure that the bidders know precisely when they have to submit their best bid.

Foreclosure sale as first-price-sealed-bid auction

In the wake of research for this book, I took part as an observer at a foreclosure sale of real estate at the Bavarian District Court. Although this special foreclosure sale was to be held as a dynamic English auction by law, it was a first-price-sealed-bid auction in the end. This came about in this way.

As is probably the case in most foreclosure sales, the owner was forced by a bank to sell his home. There were claims from creditors which were to be covered by the revenue from the sale. The mentioned bank

was the main creditor and sent a representative to the auction. Before the auction was opened, the court determined the *lowest acceptable bid*. That is the bid amount which is required as a minimum, to cover all outstanding claims.

The bank then stated that it could not determine the final amount of all claims at that time. The bank cited 250,000 euros as the provisional value of all claims. Together with the court costs and certain payment requests of the municipality (taxes, and so on), a value of 280,000 euros was set for the lowest bid.

The current market value of the property was 650,000 euros. From this and parallel to the lowest bid, there is also a *legal reservation price* of 5/10 of the current market value, that is, 325,000 euros. The foreclosure sale cannot be concluded at a lower price according to the law. Another limit is the value 7/10 of the current market value; up to this amount, the creditors can submit a motion to cancel the foreclosure sale. This motion can also be withdrawn at a later time. The bank submitted precisely this motion.

Bidding was opened at 8:52 a.m. The following people were present: the owner, the bank representative, the court, myself as observer and two real estate agents interested in the property. If you think that the two real estate pros would bid each other up in a wild, dynamic English auction, then you couldn't be more wrong. I couldn't believe my eyes as I saw what was possible in a court of law. In fact, the two whispered

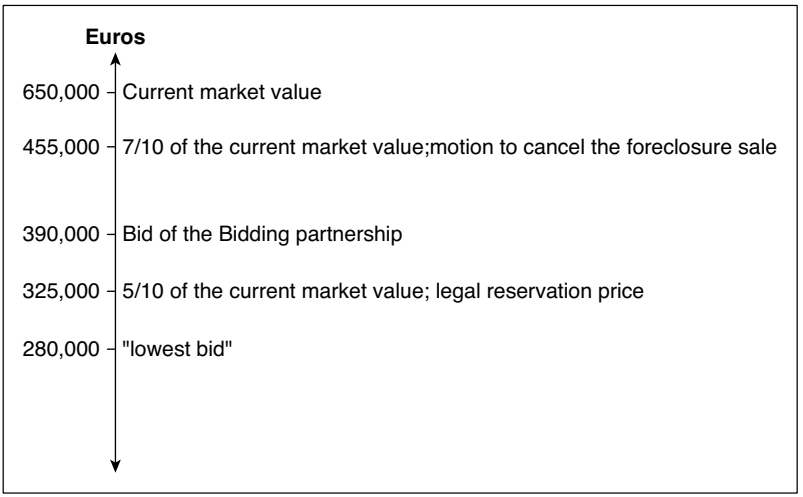

Figure 2.3 The bidding lines of a foreclosure sale

a bit to each other and then suddenly declared themselves to be a bidding partnership. They made one single joint bid and had no other competitors.

What an unbelievable trick when you think that the two would have probably lost half the margin of what they could have gotten selling the property if they had bid against one another. But it is a lot more lucrative for both to agree on splitting the profit. This is also a way to meet halfway "fairly".

The story had a second surprise from an auction theory viewpoint. The bid which the bidding partnership submitted was not slightly above the legal reservation price of 325,000 euros, but instead they bid 390,000 euros. That was the only noteworthy event in the complete bidding. But why did the two real estate pros simply give away 65,000 euros so easily?

After the event, I asked the bank representative why they did it. He explained to me that the final claims of creditors could really amount to approximately this sum, which was the reason why he had submitted a motion for non-foreclosure as a precaution. Consequently, it was still suspenseful for the bidding partnership after the auction to learn whether they had outbid this unknown amount with their bid. As a result, this foreclosure sale was effectively a first-price-sealed-bid auction for the bidding partnership. This example demonstrates that even small details in the context of an auction can result in one auction form being effectively another than you had originally assumed – with all consequences for the result of the optimum bidding strategy.[18]

2.5 The Dutch auction

Let's assume that you still want to buy a used-car and have found something on the Internet again. But this time the car belongs to a dealer, who has the car at his dealership and is offering it at a relevant Internet site for used-cars. The dealer wants to sell for 22,000 euros. After you inspect the car and take a test drive, you decide that you are not willing to pay more than 18,000 euros. Do you believe that a deal will be concluded this time?

If you try to negotiate with the dealer, you will discover that most used-car dealers have stopped negotiating in the era of Internet used-car markets. A typical statement is that the car is being offered for 22,000 euros on the Internet, and if you do not want to buy it, then he will surely find another who is willing to pay this price. The dealer only reduces the price to 21,500 euros if no one interested contacts him after

a few days. Many dealers even say openly, "Just wait four weeks; then I'll be at 18,000 euros. If the car is still there, you can have it." I tried that once – the car had of course already been sold. The essence of this method is that the dealer does not want to set the price with you in bilateral negotiations, but instead prefers asking the market. By asking all prices from top down, he scours the market for the right price. In fact, he conducts an auction with an open group of bidders. The less pressure he has to sell the car, the more time he can invest and the longer he lets the individual price increments stand. The *visibility* of his offer increases with a longer term, that is, the number of interested parties who become aware of his offer and consequently the chance for a good result.

But which auction form does this "auction" have? It is a question of a sales auction, in which the price sinks in a ticker over time until the first buyer confirms the price (see Figure 2.4). Then a deal is concluded and the auction ends. Apparently, it is a *first-price auction*, because the bidder with the most *willingness to pay* gets[19] the item, and he does it at his own bid price. But it is not a first-price-sealed-bid auction, because not all bidders have submitted a "sealed bid" in an envelope.

Instead, only one single bidder confirmed the price; all other interested parties waited and observed what was happening. In this sense, it is a question of an "open first-price auction". To differentiate it from an English auction (which is more or less an "open second-price auction"), it is called

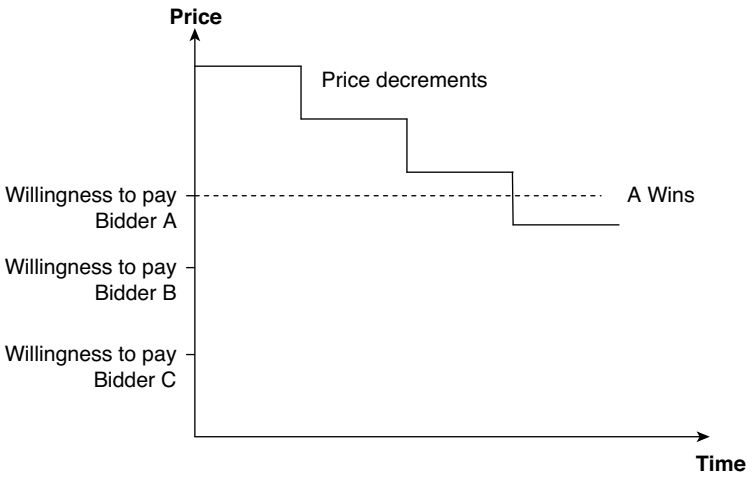

Figure 2.4 Sequence of events of a Dutch auction

a *Dutch auction* (also "*Dutch ticker auction*"). With that, we have found a fourth auction form which closes a certain gap between the first three.

Dutch auctions with open group of bidders on the Internet

When you want to sell something on the Internet and you like the principle of the Dutch auction, then you can of course do the same as used-car dealers and reduce your fixed price manually from time to time. For example, you have this option at eBay if you offer an item there solely with buy it now option for a few days. Each time the limit expires without someone buying the item, you can put the item back in at a lower buy it now price. You can even explain this method in the description of the article. Then an interested person, who is basically interested in the item but does not want to pay the current price, might buy the item in the end after waiting. This method can really make sense for valuable items. The first auction platforms, which want to differentiate themselves from eBay with innovative auction forms, provide a bit more convenience. One example was azubo.de, where you have been able to hold Dutch auctions under the term "Countdown Auction" or to take part in them. Until now, however, eBay has had an advantage thanks to its enormous range of visibility, that is, a manually simulated Dutch auction at eBay will probably reach a lot more interested people and consequently provide a better result than a conveniently configured Dutch auction at azubo.de.

A Dutch auction at a real estate sale

Three sisters could not agree whether their family should retain ownership of a jointly inherited vacation home in the mountains. While Andrea wanted to sell the house, Barbara and Claudia could imagine using the house for their own families. But they also disagreed about the property value. Because it had a beautiful view in the middle of the mountains and all three had spent their childhood there, it had a special ideal value for them. Andrea believed that they could also get this price on the external market. She believed that a price around 700,000 euros was realistic for the property.

But the two other sisters were short of money and – even if they combined their resources – they could only offer the other sister 140,000 euros for her third. That would correspond to a total value of 420,000 euros. The going price for land in this location was actually only 300,000 euros, and all three agreed that the house in itself would not represent a lot of value for an external buyer. But how much someone who loved the area might be willing to pay was something about which they could only make assumptions.

Against this background, the three agreed on the following. Andrea would have one year to sell the house. If she succeeded in finding a buyer, Barbara and Claudia would have the right to stop the sale and buy the house for the offered price. But it was clear that they would only do this up to a purchase price of 420,000 euros.

If Andrea did not find any buyer willing to pay more than 420,000 euros, then she would sell her third for 140,000 euros to her sisters. Those were the basic ideas of the agreement.

If Andrea found a buyer after a short time, who was willing to pay 450,000 euros, for example, the following conflict would arise: On the one hand, the sisters would learn that the house apparently had a more attractive market value. But the first-best buyer is only by a rather big chance the one with the most willingness to pay. Other buyers would certainly be found in the course of the year, who would be willing to pay even more. On the other hand, the first buyer usually does not want to wait a long time for the decision to sell. He will only feel bound to his bid for a limited time. From his viewpoint, it is understandable that even if he were not in a hurry to get a decision, a longer commitment of his offer would only mean that he would be subject to more competition from other, potentially interested people. In other words, you cannot "round up" bidders and then invite them to a general auction with an "exhibition of the property" at the end of the year.

For this reason, the sisters added the following clause to their agreement: A buyer, who wanted to buy the property, would have to surpass a certain threshold value. This threshold value started at 1,000,000 euros at the beginning of the year and decreased linearly over the year down to 420,000 euros at the end. With this agreement, the sisters protected themselves against selling "too early, too cheap" and also made it theoretically possible for an interested person to buy the house for slightly more than 420,000 euros. Andrea was only willing with this option to sell her one-third for 140,000 euros in the worst case to her sisters.

You have certainly realized that the sisters effectively did nothing other than agree on a Dutch auction. In fact, the house was sold after a few weeks for 835,000 euros, with which all three sisters were quite satisfied in the end.

2.6 Summary

The complete auction theory can also be applied both to the world of sales auctions ("forward auctions") as well as to the world of purchasing auctions ("reverse auctions") in a mirrored form. The traditional auction

form known to everyone as the dynamic English auction is a second-price auction, that is, the achieved price corresponds (essentially) to the second-best bid. The English auction is an "open second-price auction", because the bidders observe each other mutually during the submission of bids. Analog to that, secret bids are submitted in a second-price-sealed-bid auction and the item is allotted to that bidder who submitted the highest bid but at the price of the second-highest bidder. In the first-price-sealed-bid auction, the item goes to the person with the highest bid at his own bid price. Finally, the Dutch auction is an "open first-price auction", in which bidders wait with increasing tension until an increasingly attractive price is accepted by the first bidder.

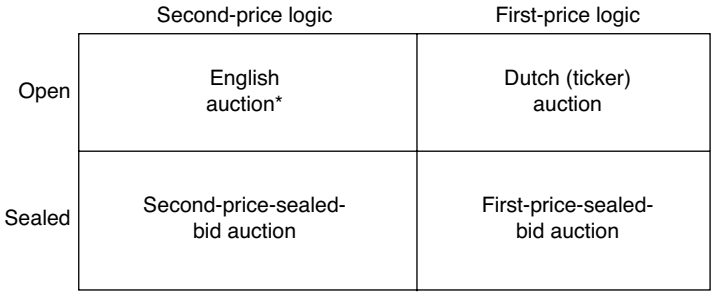

Figure 2.5 Overview of auction forms [20]

3
Negotiations for Several Objects

3.1 Simultaneous and sequential negotiations

Have you looked at Dutch auctions at azubo.de? Then you certainly noticed that many offers are from commercial traders similar to at eBay. They tend to offer the same item several times. Such parallel auctions then also run at different times, but also in part simultaneously next to one another.

Now imagine, for example, that you want to buy a washing machine for your household and find a suitable model at azubo.de in a Dutch auction. The washing machine is offered there by an Internet dealer as new in original packaging. The price is at an acceptable 400 euros at the moment, but the auction ticker will only run two more hours and then the price will sink to a fantastic 290 euros. You are considering whether you should wait a bit to get a better price or you can buy it immediately before someone else snatches it away from under your nose. Then you discover that the same dealer is offering nine more of these washing machines in a parallel Dutch auction. How would you react?

You would hardly buy immediately. Why should you? The price will become more attractive with each additional minute that you wait. The risk opposing this strategy, that someone else will snatch the washing machine away from under your nose, no longer exists after you discover the other auctions. If someone else buys a washing machine, there are still enough other ones available.

As a bidder, you must only react fast enough before all washing machines have been sold. The fatal fact for the auctioneer is that even if there are a lot more than ten people interested in buying who follow the auction for the ten washing machines, each one thinks the same thing: “Why should I buy if there is no risk (yet) to not get one of them?”

Consequently, all will wait until almost the end of the auction. Only after the first washing machines have been sold will the other bidders think that it might become difficult to get one and also buy. But all ten auctions will almost certainly end with a poor result for the auctioneer.[1]

We learn from this that a Dutch auction can easily return an adverse result for an auctioneer if he wants to negotiate several units parallel. If the bidders are only interested in one item, then the parallel offer of several units results in each interested person being aware of already having an alternative to the individual auction. In a Dutch auction, it provides bidders with the fatal strategy for auctioneers to wait a bit longer when in doubt.

A later alternative prevents success for the auctioneer

A later, already announced auction with the same item is an alternative for interested persons, which results in them bidding less aggressively. This relation not only applies to Dutch auctions such as at azubo.de, but also in general and consequently also at eBay, for example. The auctioneer of several units would do better to wait until the current auction has ended before he opens the next auction to avoid the effect of available alternatives for bidders. But that costs time and is not very credible for a commercial dealer, because he normally has more than one piece of the same thing in stock. In this situation, a *"buy it now offer"* with several available items, as can be offered at eBay, is preferable. There, the seller offers his goods at a fixed price, and a display with the available number of items reduces this number with each purchase. But because it is not a question of a Dutch auction, but instead a fixed-price offer (more or less a TIOLI), no bidder can get an advantage by "tactical waiting" or similar behavior.

On the other hand, the seller must know the market price of his goods to ask for the most successful price. The supermarket manager, who had to set his butter price carefully, is a good example.

A retired watch dealer, who sold his remaining stock of certain collector's pieces at eBay, made me an almost immoral offer. At a conventional eBay auction he offered an exotic watch which I was very interested in. One single bidder had confirmed his start price and the auction was only open one more day when I contacted the seller. I wanted to find out whether the other watches, which could be seen in the photos of the auction, were still owned by him and might also possibly be for sale. He told me that he was selling his last pieces and actually only a handful of them were left. But there was a second watch of the special one offered in the auction. He asked me to bid in the auction. If I ended

as second-best bidder in the auction, he would sell me the second watch at my last bid. Would you have accepted his offer?

Of course, I explained to him that auctions at eBay are second-price auctions and consequently the other bidder also got my bid as price. If I then drove up the price, then I would not only drive up my own price, but also that of the other bidder. Of course, I should receive a commission for that, to which he of course did not agree. But the knowledge was much more important for me that he would offer the same watch anyway soon again on the Internet, that is, I of course did not bid for the first watch. Instead, both the other bidder in the first auction and I in the second auction got one of the watches at the starting price, which the watch dealer had selected each time. The result could have also been achieved with a buy it now offer and with less stress for all of us. The watch dealer might even have been able to get a somewhat higher price with that.

Simultaneous negotiations are usually recommended – but not always

The effects of later alternatives to current negotiations, as we have observed in open Internet auctions, also apply in every other context. In most situations, it is recommended to talk with all negotiation partners about all items at the same time, even and especially when a contract should be concluded with more than one partner. In the following sections, we will get to know various auction forms that have been designed specifically for such simultaneous negotiations. But first I would like to give one more example, in which a sequential negotiation really would have been better.

A department store chain for electronic devices meets regularly with the manufacturers of digital cameras for price negotiations about the new models in their product range. The department store chain cannot normally guarantee any sales figures, because customers in the stores decide which camera is successful and which one is a slow-seller. The risk of the sold quantity is usually borne by the manufacturer. The department store chain can and certainly does support the sale of the models. From placement on the shelves to advertising measures and all the way to special campaigns, the department store can influence sales directly. Of course, sharing the costs of such campaigns is an important negotiation argument in price negotiations with manufacturers. On the other hand, the manufacturers know very precisely to what extent a good camera cannot be criticized and a bad camera cannot be praised. After all, they also employ their own communication measures. Against this background, price negotiations are usually very long and drawn-out.

To get higher prices, the department store chain tried to stage these price negotiations as a purchasing auction. A comparable model was discussed with all manufacturers. The number of pieces of this model was attractive, that is, it was a question of a significant share of the business with digital cameras. Because the department store chain did not want to limit itself to a single model from only one manufacturer in its own range of products, three parallel auctions were planned. The winner of auction A was promised an attractive package of advertising measures. The winner of auction B was also to get certain communication support, while the winner of auction C would only have its products sold in the chain, but would not get support for this. All three auctions took place simultaneously as dynamic English auctions, whereby the bidders were only told their respectively current ranking.

The department store chain expected that all manufacturers would all concentrate on auction A and that the biggest drop in prices for their products would take place there. After auction A had calmed down, the losing bidders would set a new price in auction B and then in auction C. That was apparently how the auctioneer imagined it would happen. But the actual course of the auctions turned out to be very different. After the manufacturers in auction A had submitted their start price, one manufacturer (the one in first place) was already satisfied. Even before they started a price war in auction A, the other manufacturers tested where they would land with their price in auction B. Again, one manufacturer was satisfied; it considered first place in auction B more important than a price war for package A with an uncertain ending. Then something happened that none of the bidders had actually expected. After the third manufacturer had submitted his price in auction C and took first place, the auction came to a standstill. No other manufacturer was on hand, who could have fought for first place in one of the auctions. The department store was apparently so confident that it actually only had admitted the three most important digital camera manufacturers to the auction. It did not want to do without one of these three in its product line, which is the reason there were three packages to win.

The department store learned an expensive lesson; three parallel auctions in a situation with only three bidders is a rather bad idea.

3.2 Combinatorial auctions

You can certainly remember the auctions for the cellular phone network licenses with UMTS standard.[2] They took place in Germany in 2000 and reaped 100 billion German marks into the government's coffers.

This impressive event was only one of many seen globally. For example, we already talked about the cellular phone network license auction in New Zealand. In addition, there were similar auctions for other cellular phone network standards, for example, an auction for GSM licenses in Germany already in 1999.[3]

A lot has been written about the rationale behind the various cellular phone network license auctions; consequently, I refer you to the existing literature. In chapter 7 of *The Undercover Economist* by Harford, you can learn on an easy-to-understand level how modern economics helped specifically to optimize these auctions. But the supplement note by the old master of auction theory Paul Klemperer about the UMTS auction in German should also be mentioned; he said: "... good luck, not good design."[4]

In fact, the German UMTS auction (similar to the previous GSM auction) was held in a rather simple way. A dynamic English auction was held parallel for each of the 12 cellular phone network licenses.

Each cellular phone network license was allocated to one frequency band, on which a cellular phone network could be operated. The bidders could choose how many (two or three) and for which frequency bands they wanted to submit bids. They only had to outbid each other until no more bids were submitted for any of the frequency bands. This is called a *simultaneous ascending auction*. It is the obvious generalization of the dynamic English auction for several auction items, and – to be truthful – the first one you think of in such a situation. We already saw in the previous section that you should negotiate simultaneously and that parallel Dutch auctions are not recommended, for example.

But a simultaneous ascending auction also has a big disadvantage. It does not consider whether a bidder obtains an advantage from winning a combination of the negotiated items. For example, if three frequency bands are worth a lot more due to utilizable synergy or scale effects than three individual bands, what should the bidder bid? For example, if he calculates the investment in setting up his own telephone network and uses this for the three bands, then he can submit a much better bid per band than if he only uses it for two bands. But he might only win two bands in the end in a simultaneous ascending auction, because he does not have any further influence on this. Whether this is a problem for the bidder or the auctioneer is a good question. We have to assume that reasonable bidders understand this effect and consequently are more reserved than they could be under consideration of effects of economies of scale.

If all bidders are reasonable, the auction result will simply be worse in terms of a lower price than it could have been.

An analog situation from the insurance industry

Even insurance companies can get into difficulties threatening their existence. This usually does not happen for the good reason that a supervisory agency exists that checks them in advance and ascertains: "The risks of the portfolio are too high and there is insufficient equity capital to cover them." Then the insurance company has to relinquish a few of its insurance policies and sell them to insurers who have a better reserve of equity capital.

This is what happened in a small insurance company which had specialized in large international construction projects such as dams, bridges, power plants and so on. Insuring such projects is a business producing a lot of revenue on one hand, because you can charge high insurance premiums. But if a case of damages does occur, you have to expect substantial claim amounts. Within the framework of a reorganization of the insurance company, they determined that they had better spin off this business and decided to close the complete department. The task was then to sell the 20 existing insurance policies to other insurance companies.

Following a market evaluation, they discovered that only two larger insurance companies were able and willing to acquire the complete portfolio. After all, the maximum cover for damages from the policies was several billion euros. Approximately 30 potential bidders also expressed interest in selected insurance policies which fit their own portfolios respectively well.

The essential factor of success in the insurance industry is to combine risks which cancel each other out mutually as well as possible (this is called *risk diversification*). The case of damage for one policy must be covered by the premiums of the other policies. The biggest danger for insurers is represented by *correlated risks*, that is, when cases of damage tend to occur jointly. For the valuation of different insurance policies, this means especially that the combination of policies must be valuated differently from simply the sum of the individual policies. Can you see the analogy for the synergy effects with the frequency bands?

The insurance company in question asked us to suggest an auction design for selling the 20 insurance policies. It was immediately clear that it would not be a simultaneous ascending auction.

The fine art of dynamic combinatorial auctions

The *FCC* (*Federal Communications Commission*) is the agency responsible for cellular phone network license auctions in the USA. Cellular phone

network license auctions take place at regular intervals in the USA even today, which the FCC holds. It has recognized the problem of synergies between the frequency bands and for years has obtained advice from game theoreticians or auction theoreticians to optimize its options. A theoretically optimum auction form in this situation is the *dynamic combinatorial auction*. It provides each bidder with the chance not only to submit bids for individual auction items, but also for package of any combination of the items. For example, if a bidder submitted an attractive price for a package of three frequency bands, then the auctioneer cannot simply make an attractive bid for only two of the frequency bands from it. Consequently, higher bids are submitted in a dynamic combinatorial auction.

This sounds rather simple till now, but it has a big catch. Mathematicians call this catch "NP-completeness" of the resulting calculation problem. In theory, each bidder can submit a bid for all combinations possible for the auction items. The number of possible bids is consequently too big to handle. It would be 4,095 with 12 items, for example.

Consequently, a bidder could submit 4,095 different bids in one auction round. And it gets even worse. After each bid submission, that combination must be determined from all current bids that produces the best result for the auctioneer. This is called *optimum allocation*, that is, the best allocation of the items to the bidders. The considered bids may not overlap (a single item cannot be awarded twice), and there may not be any other allocation that is better. The number of theoretically possibly allocations, which must be checked for that, is a number with 1,000 places with 12 items and 4,095 possible bids (for orientation: A billion only has ten places).

Consequently, determination of his optimum allocation can become so complex in an extreme case that even the fastest computer in this world would not be able to solve the problem within an acceptable time. This is the nature of the problem, which is called "NP-completeness".

Imagine what it would be like. The bidders have submitted all of their bids on all combinations of items which they chose, and the auctioneer cannot decide which bidder won what. His computer is running at full speed, and – in spite of this – the calculation of the optimum allocation will still take years because one of the unfavorable constellations was produced, that cannot be solved with calculations. Fortunately, mathematicians have proven this scenario – despite NP-completeness – is of a rather theoretical nature.

In actual practice, simplified assumptions can be made or framework conditions stipulated which make the problem solvable again.[5]

In the case of selling the 20 insurance policies, we made things rather easy for ourselves. Within the framework of preparations and in collaboration with the bidders, we limited the packages in which the individual bidders were interested.

We found that only 25 packages were really interesting. Compared with the theoretically possible 1,048,575 packages, which you can create from 20 insurance policies, this was a decisive reduction of complexity.

In the auction, all bidders could submit bids for any of the 25 packages, and it was no problem to determine the best allocation within seconds after each bid submission. The auction lasted until no more bids were received, and the bidders were satisfied with the achieved allocation. From 30 interested parties, six were able to purchase a policy package in the auction.

3.3 The Dutch multi-object auction

The Dutch auction has its name because flower wholesalers in Holland have been using it for generations to sell fresh flowers to middlemen. In fact, the already described[6] Dutch auction is only the special case of the design for precisely one auction item. The flower wholesalers offer many auction items at the same time, namely many stacks of cases of fresh flowers. Then the following happens: The price, which the wholesaler lets run down as ticker, is the price per case. That bidder, who is the first to confirm a price per case, can buy as many cases as he wants. If he selects all cases, the other bidders get nothing. If he does not take all the cases, the ticker starts anew from the last ticker increment.

"Complement" or "substitute" makes the difference

But how does this procedure differ from parallel Dutch auctions of individual items, which – as we have already seen[7] – produce a "poor result" for the auctioneer?

To answer this question, we need to get to know two terms which play a big role in auction theory concerning multi-object auctions. These are complements and substitutes. Auction items are called *complements* when the valuation by a buyer (or his indifference price) increases when he buys them together. Think of the effects of economies of scale of the frequency bands or insurance policies with uncorrelated risks. We dealt with complementary auction items there. The opposite is represented by *substitutes*. Those are auction items whose value forth of when a buyer appraises them together. Washing machines are high-quality substitutes,

but normally when you have one, you don't need a second. Insurance policies can also be substitutes if their risk correlates.

The question of whether substitutes or complements are concerned in a multi-object auction is decisive for selection of the correct auction form by the auctioneer. With substitutes, bidders tend to buy only individual items. Then the Dutch auction is a "bad idea" from the viewpoint of the auctioneer, as we saw with the washing machines.

It just doesn't happen that one bidder suddenly buys all ten washing machines. Consequently, a good strategy for a bidder is to wait until the price becomes really attractive. With complements, however, bidders tend to buy as many items as possible. Then the Dutch multi-object auction seems to work very well, as flower wholesale transactions show. You can assume that the middlemen, who buy there, are subject to effects of economy of scale, which is why the flower cases are complements. It can really happen there that suddenly one bidder buys all cases and all other bidders get nothing. Consequently, waiting too long is very risky for the bidders.

The (dynamic) combinatorial auction discussed in the previous section is robust in difficult situations when complementary and substituting pairs are in the same basket of goods. This was the case in the example of the insurance policies. By the way, the situation of the frequency bands in the cellular phone network license auctions would seem predestined for Dutch multiple object auction similar to that of the flower cases at first glance, if it were not for the government's anti-trust agency. It wants the greatest possible number of telecommunication companies to win something and consequently create the most competition possible on the cellular phone network market after the auction. Consequently, the formation of large packages is always forbidden in these auctions, or put another way: Starting from a certain package size, additional auctions are substitutes according to the auction rule. As a result, frequency bands should again be seen analog to washing machines and parallel Dutch auction are not recommended.

Complements and substitutes can be mirrored

As the complete auction theory, the theory of complementary and substituting auction items are mirrored in the world of purchasing auctions. Auction items in purchasing auctions are called complements when the indifference price of the seller *sinks* as soon as he sells them together. Think of the synergy effects, for example, between two projects won together by a supplier in the awarding of a contract. Analog to the world of sales auctions, complements have the quality here that the bidder wants to

win the highest number possible of "objects" (here, for example, project orders). On the other hand, substitutes are auction objects in the world of purchasing auctions, the valuation by the seller of which *increases* only if he can sell them together. The analogy to the sales world is that he prefers to sell them individually rather than in a package. For example, think of the purchase of a used book at Amazon, which we identified in a far-reaching sense as a purchasing auction. Individual sellers normally only have one single copy of the book to sell. If he only had the possibility to sell two copies of the book together, he would not be able to do it, which is the same as an indifference price that extends to infinity. This situation is the "mirror" of the situation of substituting washing machines in the sales world, where each bidder only wants to buy one of them. The indifference price of a bidder goes in the direction of zero there for a package of two washing machines[8] if he only needs one.

An innovative idea from actual practice: the Brazilian auction

Let's discuss another auction form at this point which is related to the Dutch multi-object auction. In a *Brazilian auction*, the auctioneer sets a fixed price and increases the quantity for the auction items (ticker-like) for this price over time. The bidder, who accepts such a quantity first, wins the auction. It comes from the suggestion of a Brazilian purchaser in a globally operating corporation, who suggested this design for purchasing auctions (as a purchasing auction, the requested quantity is reduced until a fixed price over time).

This design is effectively a Dutch auction, because the offer for the bidder becomes increasingly attractive over time. Let's consider it a purchasing auction.

You could also formulate the same events as follows: A Dutch auction runs via the price per individual item[9] and the auction profit is the delivery order, whereby the scope of delivery is derived from a fixed budget.[10] That is the main reason behind this auction form in actual practice, because corporations often only buy on the basis of a fixed budget. The quantity is then derived from the price.

3.4 Tender auctions

A private Berlin bank held auctions for certificates of deposit on the Internet in 2004 and 2005. A quota of ten million euros in small tranches was offered for individuals as 90-day fixed deposit investments.

Interested bidders could select freely from investment amounts between 10,000 and 100,000 euros and a desired interest rate with a maximum of five percent.

The bank first considered all incoming bids until the quota of ten million euros was filled. Then new incoming bids pushed out those with higher demanded interest rates. Updated every second, the six leading bids as well as the interest rate range of all currently considered bids were published on the Internet. This process lasted a few days. Whereby the interest rate level decreased further as in a dynamic English purchasing auction.

Three aspects of these interest rate auctions had decisive influence on the dynamics and the result of the events. On the one hand, there was a set deadline for the auction. Evenings at 8 p.m. on a set and announced day, "rien ne vas plus" applied. The bidders, who learned from this auction for the next one and optimized their bidding strategy, noticed that the most suspenseful phase was shortly before the end of the bidding deadline. All previously submitted bids only expressed the interest rate and ran the danger of being pushed out again. Whoever really wanted a bargain, waited and placed his bid so shortly before the end of the auction that no other bidder could probably react to it. This procedure is called sniping.[11] However, a second aspect worked against this which many bidders soon understood how to use. At the final allocation, the bids, which named the same interest rate, were preferred to those that were submitted earlier. It actually was a successful strategy to estimate the interest range of the bids considered in the end at an early state and to place a bid with this interest rate, even if the general interest level of bids had not reached that level yet. But this strategy could only be successful in connection with the third aspect; without this third aspect, this earlier bid would have only driven the interest rate down faster and the final competition would have again taken place at the end of the bidding deadline.

The third aspect was the obvious and (also via this action) unalterable current market price level. Even the private bank holding this auction offered 90-day fixed deposit certificates parallel at an interest rate of two percent without any quota limit. Consequently, the auction was limited de facto in its course downward, because no bidder would have ever submitted a bid below two percent. In fact, the successful bids were always between 2.5 percent and 3.5 percent at the end from event to event. Whoever bid 3.0 percent at the beginning, for example, had a good chance of being considered in the end too.

Does this procedure provide a market price?

We can philosophize about whether the market price for 90-day fixed deposit certificates was really two percent or whether the auction didn't prove that it was actually a bit higher. If the auction had not had a deadline, but instead had continued until no bid was received anymore, then it would have likely continued until only bids of two percent remained.

That would have confirmed the current market price then. But that is only an assumption that such an auction would have run that long.

At least now you should ask whether the auction made sense at all for the bank. The question is especially posed of why the fixed deadline was selected. The bank was obviously not concerned with checking the market price level. Instead, the auction had a big marketing effect. After all, it recorded participation of a few hundred bidders in each auction. The winning bidders all opened (automatically) an account, were very satisfied with the great interest rate and have certainly remained clients of the bank for the most part. Whether the bank could then reap an even higher return with the ten million euros than the final average interest rate for the winners will remain a secret forever. If not, the difference was a worthy advertising expenditure for the bank in any case.

The American and the Dutch tender auctions

The auction procedure, which the private bank had chosen, certainly reminds us not by chance of that which the central banks (e.g., the European Central Bank ECB) conduct at regular intervals for refinancing the bank sector.

In former times, the ECB offered the commercial banks central bank money at a specific interest rate. The commercial banks then communicated their needs for central bank money to the ECB. If the banks reported higher needs than the central bank wanted to issue, then the allotted amount of central bank money was reduced proportionately for all banks ("*pro-rata allocation*"). This procedure was called *fixed rate tender operation*, because the "bidding" banks only had to cite the required quantity. This procedure cannot really be considered an auction, because it did not have any market components or mechanism for pricing. The banks became accustomed to cite a greater need than really existed in order not to get too little in the pro-rata allocation.

Consequently, the ECB has been using a real auction procedure since 2000, the *variable rate tender operation*. The bidding banks not only cite the required quantity of money with their bids, but also the interest that they are willing to pay for it. The bidders submit their bids as in a sealed auction and have to wait and see whether they get what they want with them. That really does remind us of the fixed deposit certificates of the private bank; but here it is not a question of a "purchasing auction for money", but instead of a "sales auction for money".

The central bank makes central bank money available to the commercial banks and of course gives preference to the bids with the higher

interest rate. In addition, the "dynamic English components" of the fixed deposit certificates were not used.

Consequently, the three aspects of the fixed deposit certificate auction falsifying the results do not apply either to the variable rate tender operation of the ECB.

In this, there are two variants of the variable rate tender operation: the *American* and the *Dutch tender auctions*. While in the American tender auction, each bidder pays the interest he bids[12], all bidders pay the same interest rate in the end in the Dutch tender auction. This is the lowest interest rate which wins in the auction. The ECB uses the American tender procedure, while the Dutch tender procedure is also customary in the international financial sector.

Tender auctions outside of the financial sector

The generally accessible Internet auction platform besteauktion.de did provide a *Dutch auction*[13] for selling multi-units. But it was not a question of a Dutch multi-object auction as we got to know at azubo.de, but instead a Dutch tender auction as it developed in the financial sector. It should be expressly pointed out here that the Dutch (multi-object) auction and the Dutch tender auction are two completely different procedures, which only have the same word "Dutch" in them by chance. If you want to sell three washing machines in a "Dutch auction" at besteauktion.de and you receive more than three bids, then all bidders get their washing machines at the price that the third *best* bidder submitted (see Figure 3.1).

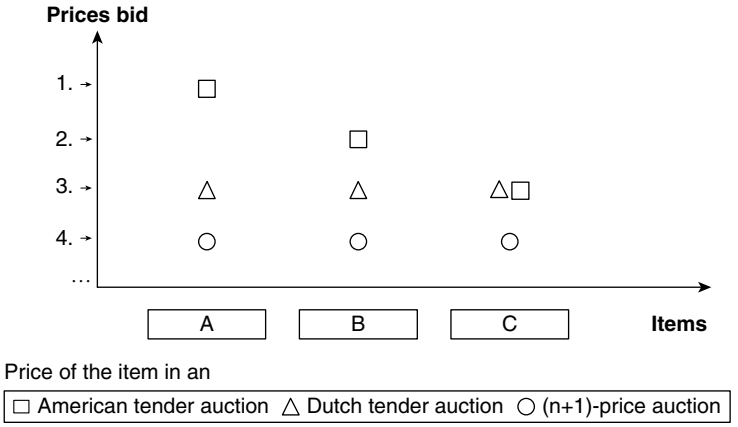

Figure 3.1 Prices resulting in tender auctions

Interestingly, something very similar happens at eBay – but very different at the same time. There are "multi-auctions" there which are designed to put three washing machines in an auction. By the way, it is forbidden by an eBay policy to put more than ten of the same item in separate auctions.

A multi-auction at eBay operates very similarly to a Dutch auction at besteauktion.de, but with a small difference: At eBay, the three highest bidders all get their washing machines at the price which the *fourth best* bidder submitted! (see Figure 3.1) That is one unsophisticated form of Vickrey logic, which generalizes the "second-price auction" for an auction item into a "(n+1) price auction" for n items. Although that is theoretically correct, the seller should always think about the alternative in the practice of auctions for material goods of a "buy it now offer" corresponding to a TIOLI.[14]

3.5 Summary

In the consideration of whether to employ simultaneous or sequential negotiations, you must take into account that known alternatives for bidders result in more conservative bidder behavior. Consequently, simultaneous negotiations are preferable in general.

For an overview of all auction situations with several auction objects, three cases have to be differentiated:

A) Equal units which are demanded as single object ("inseparable demand"): Here, the classical theory of single object auctions is applicable directly, whereby the Dutch Auction must be watched carefully because it gives bidders the opportunity of collusive behavior.
B) Equal units which are demanded by bidders in certain amounts ("separable demand"): This is the field of tender auctions. The result of a classical Dutch multi-object auction here corresponds to an American tender auction, which can be understood as a generalization of the first-price-sealed-bid auction to multi-unit auctions. The Dutch tender auction is a namesake that differs significantly in its result and that can be located between first price logic and (n+1) price logic with its n-price logic. We will get to know an open n-price auction (the *Hong Kong auction*) in Part III of this book.
C) Different objects that might be substitutes or complements. The latest here, but already under (B), the refined art of auction theory is represented by combinatorial auctions. They consider substitutes and complements among the auction items in that bidders can submit

bids on any item combinations. However, these auctions may entail considerable calculation problems of optimum allocation.

From the multi-object auctions above, the American tender auction (as *combinatorial sealed first-price auction*), the simultaneous ascending auction (as dynamic combinatorial auction) and the sealed (n+1) price auction (using the Vickrey-Clarke-Groves principle[15]) can be generalized as combinatorial auctions.

	(n+1)-price logic	n-price logic	First-price logic
Open	Simultaneous ascending auction*	HongKong auction	Dutch multi unit auction
Sealed	Sealed(n+1)-price auction*	Dutch tender auction	American tender auction*

*These auction forms can be generalized as combinatorial auctions

Figure 3.2 Overview of multiple object auction forms

Part II
Rational Negotiation Strategies

4
Basic Principles of Game and Bargaining Theory

4.1 The prisoner's dilemma

If you like to drive fast, then are you continually in danger on the highway of getting into a *prisoner's dilemma*. This will happen even without speed limits or police checks.

Imagine you are approaching a traffic jam which has already been announced on the radio. You have already passed the last possible exit, so you can't avoid the jam. In this situation, the best thing for all driving toward the traffic jam is to reduce speed so that the jam increases more slowly at its bottleneck (e.g., at the site of an accident). If the road is totally blocked, that of course does not work, but only very few traffic jams are caused by a total roadblock.

Most traffic jams actually worsen once their cause has been remedied, but then the described effect is especially striking. If everyone driving toward the traffic jam drove more slowly, the traffic would slowly return to normal and all would get to their destinations more quickly. But why don't drivers behave in that way?

Let's return briefly to the situation we've described. There is a lot of traffic, but it is still flowing smoothly enough for you to pass other cars when you drive in the left-hand lane. You have an especially big advantage if you pass as many vehicles as possible before you reach the tail end of the traffic jam. And of course the advantage becomes bigger the slower the others drive. But individual drivers, who slow down, have the disadvantage of being stuck in the traffic jam for an especially long time.

This situation results in the fact that a great number of drivers do not even think of slowing down when approaching a traffic jam. The average speed of the traffic flow does not decrease at the approach of the

traffic jam even if it has been announced on the radio. On the contrary, the traffic jam becomes bigger and all have a big disadvantage in the end.

That is precisely the nature of the prisoner's dilemma: A situation in which the collective choice of an equal alternative action by all players becomes a general disadvantage, because each individual sees an advantage for himself precisely in this alternative action.

Formulated abstractly, the prisoner's dilemma is a *simultaneous game* with any number of players. "Simultaneous game" means all players act at the same time.[1]

In this, each player has two alternatives ("drive slower" or "drive faster"). The payout which each player receives after all players have selected their alternative has the following qualities: All players receive a relative high payout if all choose the first alternative (traffic slowly returns to normal if all drive more slowly). But an individual player receives a bigger payout only if s/he chooses the second alternative (the individual saves the most time if s/he quickly passes all the others). The crux of the matter is that players receive a relative low payout if they all choose the second alternative (the traffic jam gets bigger if all drive fast). In turn, an individual player gets the least if s/he is the only one to select the first alternative (if only s/he drives more slowly, s/he is stuck in the traffic jam for an especially long time).

The prisoner's dilemma is a situation encountered in daily life

In daily life, many of the situations we encounter can be identified as a prisoner's dilemma. For example, environmental protection is a prisoner's dilemma in air pollution, overfishing, garbage production. If everyone restricted his contribution to this, it would be better for all.

But if only one individual acts differently, he has a big advantage (except for his moral burden). If only a few people behave "correctly," this hardly helps the environment at all and these few make life difficult for themselves.

The name "prisoner's dilemma" comes from a model situation similar to that of regulation for those who turn state's evidence[2], with which it is normally described in game theory literature. Two persons accused of being accomplices in a crime are both enticed to confess: The district attorney promises them a *payout matrix* in the form of (reduced) prison years, as shown in the scenario in Figure 4.1. At the end, both prisoners confess, so as not to be the one found guilty of lying and given a longer sentence.

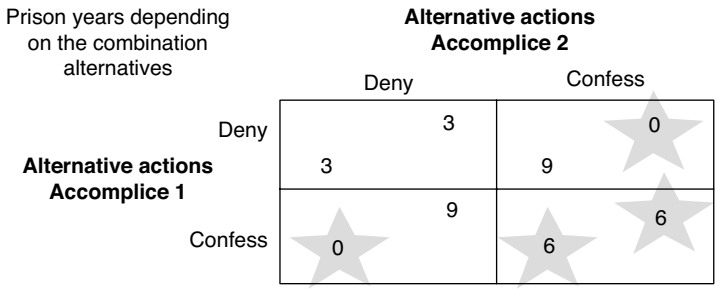

Figure 4.1 The Payout Matrix of the Prisoner's Dilemma

The prisoner's dilemma has shaken the foundations of economics

In this more or less forced common choice of the collectively worse alternative in the prisoner's dilemma, the players have to find an answer that is beneficial to them both. Neither player can improve his position based on this combination of alternatives if only he selects a different alternative. Such a situation is also called a *Nash equilibrium*.[3] The prisoner's dilemma with its suboptimum Nash equilibrium for all players contradicts the theory considered valid until then and attributed to Adam Smith (1723–1790) of the *invisible hand*. This theory maintained that the best ensues for all if each person optimizes his own position.[4]

Since the 1970s the invisible hand has been considered a mistake. On the other hand, the prisoner's dilemma plays a central role in modern competition theory, with its conflict between individual and collective rationality. If all competitors who sell an item of equal value renounce claims to a higher market share, then all can keep their margin at a high level. But if only one reduces his margin, he will conquer the market quickly with his better price and consequently make the biggest profit. If all compete for the market share with a reduced margin, all will make less profit. Anyone who alone keeps his margin high will only have a small market share in the end and will make the least profit.

This *competition prisoner's dilemma* holds that in negotiation situations the competition argument is a rather potent weapon. Later, we will examine auctions as a prisoner's dilemma for bidders. However, we will first observe in the following section that it loses its frightening aspect when it is embedded in a larger context for the same players.

4.2 One-shot games and repeated games

Do you think that gas station chains call each other on the phone to coordinate prices? We all agree that the competition prisoner's dilemma does not work so well with gas prices. If it did, all gas stations would have to court the favor of drivers and outbid each other over low prices to maintain their market share. Something seems not to work in this market, because competition does not seem to play a significant role.

Imagine the situation of the owner of an independent gas station. He can set his price at any time and is free to make his own business decisions. Let's assume that he has a market share of 20 percent in his street, which he has achieved with respect to the two big brand name gas stations. Experience has taught him over the years that he should set his price precisely one cent lower than the brand name stations. What do you believe would happen if he reduced his prices by five cents (let's assume that is half of the margin he would still have)?

His sales would certainly increase relatively quickly. It is even imaginable that his market share would increase to far more than 40 percent – that is, he would increase his profit in the end. This is precisely the consideration which would result in the prisoner's dilemma. All would reduce their prices in competing for market shares. You can be sure that the brand name gas stations in this street would call their main office, *Pricing* Department, on the same day (note: The gas stations do not call each other, but instead only make calls within their own company) to report the price of the competitor.[5] The brand name gas stations would reduce their prices by five cents on the same day, exactly as the prisoner's dilemma predicts. Then all would again have the same market share as previously, but only with half the margin. That would cost the brand name stations a lot of money and could even threaten the existence of the small one.

The independent gas station owner has already tried out this scenario several times in cautious campaigns. He was again at the same level of sales after a few hours. Consequently, why should he give up his margin? He prefers living with the small margin that the brand name gas stations leave to him. By the way, they let him continue doing business only because they know that another small-scale entrepreneur would open an independent gas station in the street a few weeks later if they squeezed him out. In the long term, such competition does not pay, neither against the great number of small-scale entrepreneurs nor against each other.

"One-shot game" or "repeated game" makes the difference

But why doesn't the prisoner's dilemma apply in this case? The prisoner's dilemma works unconfined if there is no "life after the game," that is, if a *one-shot game* takes place. Then the "players" only act rationally within the scheme of the one-time payout and supposedly optimize their position by playing the Nash equilibrium. But if those involved meet again after the game, then the complete picture or the *bigger game* must be considered, namely the prisoner's dilemma and "life thereafter." The same players typically meet in a similar situation at regular intervals – in a *repeated game*. The competition prisoner's dilemma is usually such a repeated game, because the same competitors meet repeatedly in one market, mostly even with the same customers.

But repeated prisoner's dilemmas are no longer a simple prisoner's dilemma in a bigger game. The individual players no longer have only two alternatives, but instead numerous different combinations of alternatives in the individually repeated situations. In addition, this opens up completely new possibilities of mutual observation and reaction. Each player must add up the payouts of the individual repetitions (if he is familiar with the mathematics of finance, he may further *discount them*) to obtain his overall payout.

Repeated games have the danger of creating cartel-like situations

When there are repetitions at regular intervals, players often succeed in coordinating matters consciously or unconsciously and consequently void the law of the prisoner's dilemma. This is called *collusive behavior*[6] or competitors' *conscious parallel behavior*.

An explicit agreement, which would be illegal in any case, is not necessary in such markets. The repetition of the game acts as a stabilizer for coordination, because it provides a chance for the players to react to the behavior of the others in the previous game. The players punish each other mutually (this is called the "*Tit-for-Tat*" *strategy*) if one of them falls prey to the defect from acting in line with the best situation for all.

That is precisely what happens on the gas market. The independent gas station owner knows very well that he will be "punished" very soon. Consequently, he prefers to give up the short-term increase in profit which he could get with a price reduction. To calculate this consideration rationally, he must compare his current *collusion profit* with his one-shot or short-term *defection profit* and the lower profits in the future when he is punished (see Figure 4.2).

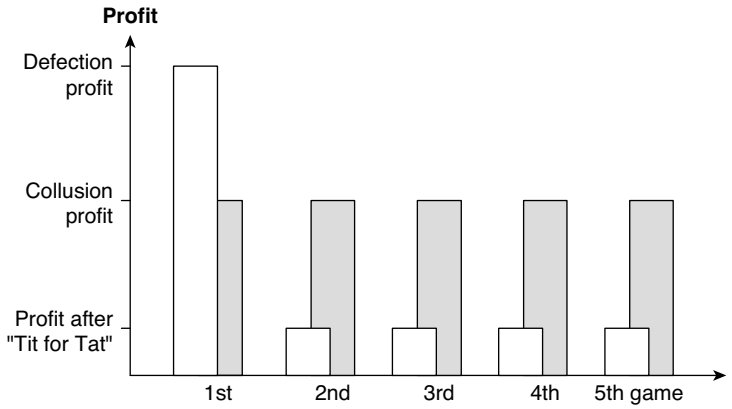

Figure 4.2 Collusion (cartel-like coordination) versus defection

The more often the game is played and the shorter the intervals, the more the punishment hurts and consequently the collusion becomes the better alternative in a comparison. A second aspect is the ability to observe the offers of the other bidders. The bidders can only punish if they can observe each other mutually. Someone who defect and is not discovered need not expect to be punished. But if bidders can observe each other mutually, then only the constant danger of being punished provides an incentive to collusive, cartel-like behavior. When the number of market participants is also limited (collusion is of course easier with only a few bidders than when there are many), then it looks to the outside as if it were an agreed-upon cartel without anyone having used the telephone for it.

It is even worse with the gas stations; the mechanism even works in the other direction. If one gas station raises its price, then it loses market shares in the short term and might have to lose some of its profit. But the competitors become aware of the price increase immediately, which is an open invitation to go along for a higher margin. The competitors often like to do that, so that the market shares are distributed afterwards as they have been previously, but all with increased margins. The bitter realization is that the gas price is almost always unavoidably at the highest level that drivers are willing to accept.[7]

The "one-shot character" intensifies competition

A bank with branches throughout Germany decided to establish a new computer center. It was supposed to ensure the IT infrastructure of the

complete data transactions at the bank at a state-of-the-art technological standard. An amount in euros in the two-figure million range was budgeted just for buying the hardware. Only a small number of well-known manufacturers of high-performance servers were suggested as possible suppliers. Although these competitors competed regularly on the market, the bank's call for bids had a unique incentive for the sales representatives in question. In addition to the attractive scope of the order, there was the prestige effect that the customer radiated. The call for bids had a strong one-shot bid character for the suppliers.

The final price negotiations were held as an auction, with four bidders.

The bidders were apparently in a prisoner's dilemma and submitted bids as if they had plenty of servers in stock. The auction resulted in a price that nobody at the bank had considered possible. A few million euros were saved compared with the target price set in the preceding negotiations.

4.3 Split the benefits?

Do you know the negotiation argument that "I also have to feed my family, including grandma and six children"? What do you think of that?

Let's consider negotiations between a renowned architecture firm and a small-scale skilled worker. The skilled worker has a liquidity bottleneck and actually has difficulties supporting his family. His continually decreasing hourly wages, the result of competition pressure, are reducing his profits from one year to the next despite a sufficient workload. He has been a good partner of the architecture firm for years and knows that he is also appreciated as such. Consequently, he informs his customer about his financial problems during the negotiations for the next project. If he does not get the order at a certain minimum rate, then he will have to close his business. But that is very dangerous. If he does not succeed in proving the ultimate danger of business closing due to liquidity problems, then the effect of the argument is turned against him. The architecture firm might go along with the worker's demands in one or the other project to keep a reliable partner. But in the long term, the firm knows that the worker needs every euro urgently. This puts him (the skilled worker) in an *even* more difficult negotiation position if he ever wants to negotiate for a higher margin.

The difficult negotiation position, given liquidity problems, can be explained using the *utility function*. This function describes the utility which a person or company attributes to an amount of money. The

surprising thesis of some economists is that the utility function is supposed to be concave (Figure 4.3). To be concave means, for example, that the utility of an additional 50 euros decreases the more money is available. If these are the first 50 euros, they are extremely important, perhaps because he can buy some groceries for his family. If it is the 50 euros between 1,000,000 euros and 1,000,050 euros, then the owner might not even notice if they are missing. In a certain sense, the concave utility function is nothing other than an elegant formulation of the fact that more dollars you have, the less you pay attention to pennies.

Economics provides a more profound reason why the utility function can be assumed to be concave. Let's compare the utility of uncertain payouts (e.g., a lottery; see Figure 4.4) with the utility of certain payout of the expected value.[8] If you value both as having the same utility, then you are *risk neutral*. *Risk aversion* means a preference for the certain payout of the expected value; that is, attributing a higher utility to it than to the uncertain payout[9] (e.g., a lottery; see Figure 4.4). A linear utility function means the same as risk neutrality and a concave utility function signifies risk aversion. This is assumed for typical, rationally acting economic units.

The question of why so many people play the lottery and speculate on the securities market is also a question that economists deal with frequently, but it is beyond the scope of this book.

Whoever cannot afford to lose loses

The concave utility function augurs badly for the skilled worker with a liquidity bottleneck. It says, rather, that every additional 50 euros

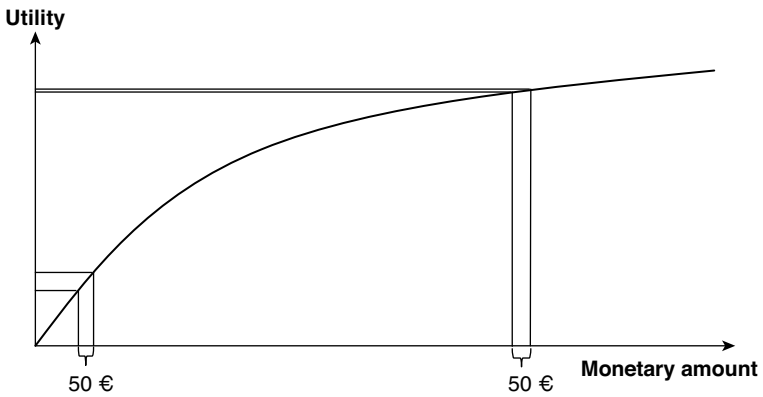

Figure 4.3 A concave utility function

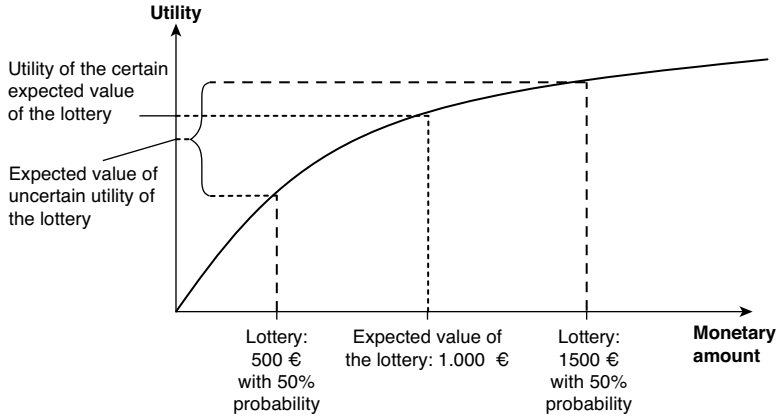

Figure 4.4 Concave utility function and risk aversion (using the example of a lottery)

is more important for him in the sense of higher utility than for the architecture firm.

What would the worker think of dividing up the pie in such a way that both parties obtain the same utility from their received share? The more utility somebody gets from one single euro, the smaller his share need be to receive the same utility as his counterpart with the rest of the pie. In experimental bargaining theory, this procedure has actually been confirmed in experiments with students time and again. If both negotiation parties are aware of the assessment of utility of the counterparty, then they divide it "fairly" based on the utility and not the pie itself. The two pieces of pie are not of equal size, but instead the two utilities that are derived individually from it are of equal size.

Exactly the same phenomenon can be observed in actual practice. The more urgently someone needs a project, the more he is willing to give up part of the margin. At the end, he only gets a smaller piece of the pie, although (or because) he needs it much more urgently. On the other hand, everyone (company or individual) tries to present his own financial status as being as good as possible.

This serves primarily, of course, for selling oneself as well as possible. But it also generates a better negotiation position with the argument that "Actually, I don't really need this pie."

An exception to this is represented by consulting for financial restructuring. When a company is close to bankruptcy, precisely this situation can

be very effective as a negotiation argument. The restructuring consultant often gives notice of termination on all existing contracts as his first official act and renegotiates with the remark that "If everyone does not help now, the company must declare bankruptcy." This is also worse for the contractual partners than to make concessions in the individual contracts. But this method only works if at least the management or even the owner changes. Otherwise, the company suffers the same fate as the skilled worker, who perhaps might be able to keep his business going, but pays for this with weakened negotiating power in the long term.

The Nash solution contradicts empirical experience

The *Nash solution* in bargaining theory should not be confused with the Nash equilibrium, which we have already talked about.[10]

The Nash solution is a solution proposed by Nash for cooperative negotiations. In *cooperative negotiations*, a mediator suggests a division of the pie. He is responsible for thinking of a solution acceptable to both negotiation partners.

For example, the mediator can decide to maximize the total utility of both negotiation partners with his division of the pie. That sounds plausible at first, but entails a big problem.

Let's assume that the utility function of the bidders is linear – that is, the first 50 euros of the pie are just as important for the bidders as the last 50 euros. This assumption is easy to understand for a relatively small pie. It corresponds to the mathematical property of the utility function to be *differentiable*.[11] Let's assume further that the utility functions of both negotiation partners match. You get the same total utility with any imaginable division of the pie. The total utility is always the utility of the original pie size. Consequently, any possible division of the pie is a "division with maximum total utility." The maximization of the total utility is thus not a useful criterion for an acceptable negotiation solution. The mediator has to think of something else. Therefore, the Nash solution proposes a similar method, but which provides a solution for this. The "total utility" is understood not as the sum total, but instead as the product of the individual utility of the two pieces of pie for the respective negotiation partners. The maximum of the product of both individual pieces is normally unambiguous. If both utility functions of the negotiation partners match and both are linear, then the solution is to divide the pie exactly in the middle. That is simple, fair and plausible.

But the reason why Nash suggested the maximization of the product of the utility as a solution is actually very different. Nash was driven by the observation that the utility function only describes the course of

quality with an increasing amount of money; it lacks a measurement unit. Consequently, neither its absolute level nor its average gradient can be adjusted. In mathematical terms, the utility function is "only defined up to *affine linear transformations*."[12] Consequently, Nash proposes a negotiation solution which is *invariant* under affine linear transformations of the utility functions of the negotiation partners. Put simply, this means that the solution remains the same even if one of the negotiation partners sees twice as much utility in the same amount of money as the other. The product of the utility fulfills this property. Our skilled worker would certainly be very pleased with this proposal: The Nash solution divides the pie and not the respectively obtained utility from it "fairly."

This means that the Nash solution contradicts the empirically confirmed negotiation results described above when there is asymmetric utility. This is a problem, with which current research into bargaining theory is dealing intensively. In actual practice, however, negotiation partners dealing fairly with one another should assume linear utility functions that coincide for all partners. The Nash solution becomes the idea of "meeting halfway" in this simple, special case.

4.4 Summary

Competition and the prisoner's dilemma

The prisoner's dilemma is a situation in which the collective choice of an equal alternative action by all players becomes a general disadvantage, because each individual sees an advantage for himself precisely in this alternative action. The competition situation between competing bidders can become a prisoner's dilemma if the price negotiations have a one-shot character for the bidders. In repeated price negotiations, there is danger of the bidders acting collusively – similar to a cartel. To this end, conscious parallel behavior suffices, because the bidders might also be able to coordinate their actions without explicit agreements.

Negotiation results with different utility

Experimental bargaining theory demonstrates that when there is different utility it is usually not the pie that is divided but, instead, the utility for the negotiation partners from the pie are divided in the middle. As a result, the person who needs negotiation success more urgently gets even less in his share of the pie. A similar effect can be observed in the actual practice of contract negotiations. Whoever needs to conclude a contract more urgently is willing to make more concessions.

5
Rational Bidding Strategies

5.1 Bidding in an English auction

Imagine you are bidding at an English auction in a traditional auction house. The item is an antique jewelry case meant to be a birthday present for your wife. You have a concrete idea of how much you want to pay maximum for it, because you have already found a case somewhere else that would cost 150 euros. However, its style and condition are not quite as nice as that offered in the auction. But you will not bid more than 150 euros in any case, because it is not a special birthday with a round number.

In other words, you have fixed an indifference price which you are very aware of. If you win the auction with a price that is lower than your indifference price, then you will be very pleased about the difference. But if the price in the auction approaches that of your indifference price, when will you quit? The answer is obvious; you will bid to exactly 150 euros and then give up. That is also the core of bidding strategy in an English auction: *To bid precisely to your own indifference price and then give up*.

We can discuss various other tactics for a dynamic English auction which are possible depending on the design of auction dynamics. For example, it seems to make sense in most cases to increase your bid in the smallest possible increments. In this way, you ensure that you do not have too great a difference to the indifference price of the second-best bidder if your respectively current bid wins.

But it is sometimes an advantage to signal to other bidders with an especially large bid increment that you are powerful and intent on winning. With that, however, we move into the gray zone of the psychological aspects of negotiating which cannot simply be explained rationally or

on the basis of game theory. By *bidding strategy*, we want to understand the question of which *maximum bid* a bidder will submit. In an English auction, this is determined solely by the indifference price.[1]

Analog bidding strategy in a(n English) purchasing auction

Does this simple bidding strategy, which is so easy to comprehend for an English sale auction, also apply to a purchasing auction? Let's put ourselves in the position of a production plant for mechanical parts, which has submitted an offer to a new customer, an automobile component supplier. Following extensive negotiations about many details, it is only a question of the price at the end. The customer has negotiated simultaneously with several alternative suppliers and now has invited all to a purchasing auction to take advantage of the competition argument. The purchasing auction was announced as a dynamic English auction.

Of course, the owner of the production plant has calculated as entrepreneur at which price the project still produces a profit for him and from which price he takes a loss if the price sinks further. "Profit" and "loss" are always relative terms in these calculations, which depend on how many *fixed costs*[2] and *opportunity costs*[3] the project will involve and how high the estimation of profit potential with this customer is once the production plant has its foot in the door. The entrepreneur has considered all of these things, so that he can name precisely the price at which his preference switches between "we want to have this order" and "we prefer not taking this order". In other words, he has a fixed indifference price which he is very conscious of. Exactly as in the sales auction, he theoretically must bid until his indifference price and then stop. Will he really do that?

At first glance, the difference in the sales auction is that the entrepreneur has to make a profit. If he does not make any additional money with his projects, then he need not operate his business. The indifference price is exactly that price at which it is the same whether he takes the project or not. Consequently, why should he bid this price? After all, he also has to accept the price if he wins (contrary to a second-price-sealed-bid auction, which we will analyze in the next section). As a result, he will always want to bid with a markup on his indifference price.

But when the price competition at the auction approaches his indifference price, then there is no limit before his indifference price from which it would make sense to stop bidding. Even if his profit becomes increasingly smaller, it is larger than zero as long as the price is higher than his indifference price.

But profit greater than zero is better than no profit. Again, we come to the result that it is precisely the definition of "indifference price" that the bidder will go along to precisely to this price (or, in other words, if he stops bidding beforehand, then his actual indifference price was higher). Consequently, the rational *minimum bid* of a bidder in an English purchasing auction is also his own indifference price.

5.2 Bidding in a second-price-sealed-bid auction

Do you buy things at eBay now and then? Do you know that you are participating in second-price-sealed-bid auctions when you do that?

A conventional eBay auction produces the initial impression that it would be a dynamic English auction. The bidders can submit their own bids and see the bids of the other bidders. They have to outbid each other mutually, and the highest bidder gets the item.

To this extent, everything proceeds as in an English auction. But two additional aspects completely reverse the effect of the auction design. We got to know something similar to the first aspect on the Internet auction for fixed deposit certificates[4]: the deadline for the end of the auction. At eBay, the seller also sets from the start how long the auction runs. Experienced bidders know that there is always a last bid that wins. In almost all eBay auctions, this last bid is really submitted in the last second of the auction. Consequently, why should an experienced bidder submit a bid beforehand? A bid submitted beforehand only has a counterproductive effect on the price from the viewpoint of the bidder and will most probably be outbid anyway.[5]

As a result, experienced bidders wait till the last second and then place their only bid. This strategy, called *sniping*, has above all the effect that no other bidder can react to it anymore. Normally, several bidders use this strategy; it would even be rational for all bidders to behave this way. An eBay auction then works like a sealed auction among them: each person submits his bid, and afterward all learn who won.

The proxy bidding feature at eBay

But there is also a second aspect which completely reverses the effect of the auction design. You might have noticed that a new bid that you submit does not always automatically become the highest bid, although you outbid the current highest bid. It can also happen that you place a new highest bid, but it is not shown in its full amount. What is happening here?

Proxy logic is behind this, which is implemented in eBay consistently. Each bid which is submitted is a *proxy bid* for eBay (see Figure 5.1: Bid of bidder B). Instead of the actual bid amount, the value of the second-highest submitted bid till then (see Figure 5.1: Bid of bidder C) plus a *minimum increment* is shown. (The minimum increment is the minimum outbidding amount which the auctioneer demands.) Consequently, it can happen that although a newly received bid is higher than the currently shown highest bid, it is lower than the proxy bid behind it. Then the highest bidder remains the previous one, but his shown highest bid is increased automatically.

Proxy logic does not change anything about the fact that sniping is the best bidding strategy. But it has decisive influence on how an auction works for the snipers. The winner does not pay his own bid, but instead the second-highest bid plus the minimum increment. As a result, it is really a second-price-sealed-bid auction which plays out among the snipers.[6]

Bidding strategy becomes a "no-brainer"

Against this background, put yourself into the situation where you have found a jewelry case for your wife on eBay. You have marked the deadline for the auction end in red on your calendar and are using the Internet connection of friends, where you have been invited on a Saturday evening, five minutes before the deadline. (The women believe that your friend is showing you his workbench in the basement.) The auction is at 60 euros, and it will last two more minutes. You then have to decide which amount you want to "snipe". Are you going to bid 150 euros? You discuss the following ideas with your friend.

"If I bid less than 150, than I run the danger that another bidder will bid between my amount and 150. Then I don't win, although I could

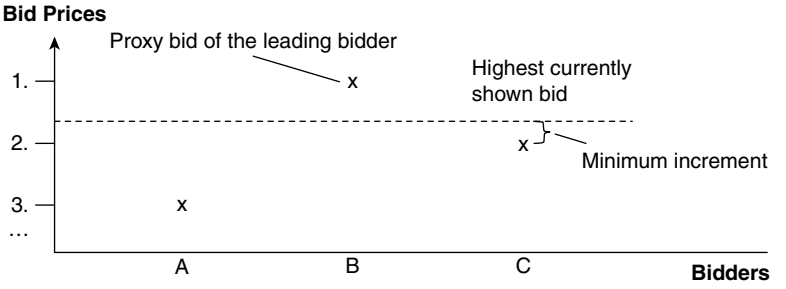

Figure 5.1 Proxy Logic

have won for a price below 150. That would really make me angry. But if I win with a bid below 150, then I could have also won with 150 and would have had the same price to pay, that is, the second-highest bid. If I bid even more than 150, than I only run the danger that a second bidder will bid between this amount and 150. Then I would have to pay more than 150, which I do not want to do."

Your friend understands and advises you not to think too much more about it and bid 150 euros. In fact, two other persons submitted bids at the last second: one for 61 euros and the other for 95 euros. As a result, the case belongs to you at a price of 96 euros[7] which makes you very happy. It paid off to bid a price that was a lot higher than the current bid. It was a good bargain in spite of your high bid.

In fact, the rational bidding strategy in a second-price-sealed-bid auction is *to bid precisely your own indifference price*. If you have understood the ideas explained above and you are certain of your own indifference price, then you never need think about what to bid in a second-price-sealed-bid auction; it is a "*no-brainer*".

You have certainly noted the analogy to the English auction. The result is exactly the same at the end;[8] the bidder with the highest indifference price wins with second-highest indifference price (plus a minimum increment) as *his* price. Although the second-price auction seems very abstruse initially, it appears very logical once you have understood this analogy.

5.3 Bidding in a first-price-sealed-bid auction

If you bid for the jewelry case in a first-price-sealed-bid auction, would 150 euros have been your bid too? If you answer "yes", we'll discuss that later. First, we want to look at the example of the awarding of a contract.

A building contractor applies for a public works project in his city. A new cafeteria should be built for the local tax office. A general contractor is being sought, who directs the complete project from architectural planning to the actual building as economically as possible. The strict procurement law prescribes a *call for bids*; this entails a detailed process, which must be carried out according to precise guidelines. It culminates in the holding of a first-price-sealed-bid auction among the bidders.

The building contractor can estimate his indifference price rather well. If he calculates all details precisely at the lowest possible prices, then he can carry out the project for eight million euros. But then he would not have earned anything extra. If he gets the contract for eight million

euros, then he can keep his business running for the next two years with the support of this secure job on the one hand. On the other hand, he would not make much money with the same degree of certainty. What do you think he will bid?

His situation and that of the other bidders, who are considering what to bid, is a competition prisoner's dilemma.[9] The two alternatives are to "calculate a slight margin" or "include a high margin". The decisive question for each bidder is how strong the one-shot character[10] of the call for bids is for him. A bidder, who absolutely needs this contract to survive, is a victim of this prisoner's dilemma and might even bid his indifference price. He cannot afford to risk losing the contract. On the other hand, a bidder who sees sufficient potential in the bigger game[11] to get other contracts, will bid high above his indifference price. He is not willing to do the job if he does not earn good money with it.

The strategic margin embodies the bidding strategy

Consequently, the question about the right bid is to weigh the certainty of wining the project against the intention of getting a good margin. The bidder has to assess his own *risk aversion*; the risk is not to win the project.

The greater his risk aversion, the closer his bid is to his indifference price. In addition, however, he also has to assess the competition. The more really interested competitors also submit bids, the fewer chances he has to get the contract with a high margin.

Consequently, the bidder weighs the alternatives of a large margin with a big risk against a small margin with a slight risk. Note at this point that his considerations about risk aversion take place on the basis of a fixed indifference price, which is not affected by this. For example, the bidder cannot reduce his indifference price only because he absolutely needs the contract. If he won the contract, that would result in sure losses, which would be worse than not to get the contract. The construction industry is especially known for this mistake in that very many bidders fall prey to this error in their bidding strategy.

Instead, a bidder must consider the number of bidders taking part in the auction, their indifference prices or his estimate of them, the risk aversion of his competitors and finally his own risk aversion. After considering all these aspects, he then has to make a decision about which bid he submits – really not a "no-brainer" in most cases. We call the result of his considerations his *strategic margin*, which he adds to his indifference price to arrive at his bid in a first-price-sealed-bid auction.

Consequently, the rational bidding strategy in a first-price-sealed-bid auction is to *include a strategic margin in a bid on the basis of the indifference price, which takes into account your own risk aversion and your assessment of competitors*. The lower your risk aversion is and the less you estimate the competition, the bigger the strategic margin is that you can select.

Strategic margins are really possible in the construction industry too. The decisive question is usually how many bidders qualify to submit bids. If a building contractor is the sole remaining candidate in the last round and maybe even has a hint of that from some good friends, then he might be able to make a killing with the cafeteria job. But if he is subject to real competition in the last round, then he will not be able to get a strategic margin, especially not in the construction industry.

The strategic margin of the purchaser

But let's return once again to your jewelry case. Would you also bid 150 euros in a first-price-sealed-bid auction? That is your indifference price, that is, you don't care at this price whether you win or lose.

You can just as well buy the alternative jewelry case. But the participation in the auction only makes sense if you have a certain chance for a better price. Consequently, why should you give up your "strategic margin"?

Think of the good result that you had in the eBay auction; you would not get it in a first-price-sealed-bid auction. In any case, however, you should make a strict distinction between the estimate of your indifference price (ask yourself the question: "Up to which price would I be annoyed if another bought it?" and "From which price would I be annoyed if I had to buy it?") and your risk aversion (that is the question of how happy you would be if you got it at a price lower than your indifference price and how much risk you are willing to take for that). After you have answered these two questions, you can and should use the same bidding strategy that we found for the purchasing auction: *to include a strategic margin in a bid on the basis of the indifference price, which takes into account your own risk aversion and your assessment of competitors*. The lower your risk aversion is and the less you estimate the competition, the bigger the strategic margin is that you can select.

5.4 Bidding in a Dutch auction

The building contractor actually did not get the contract for the tax office cafeteria in his city. Thereafter, he has been applying for a similar contract from a company for months. Again, a general contractor is

being sought for building a cafeteria. However, the company is not subject to public procurement law, that is, it can make its own decisions in the negotiation and selection process. The company has already asked for a "final offer" several times. Until now however, negotiations were restarted after every bid submission. The company obviously has several bidders between which it cannot make a decision. Because our building contractor knows this game, he included a really comfortable strategic margin in his previous bids. In addition to his assessment of the competition and his own risk aversion, the strategy behind this margin also includes the insight that once he "lets the air out" of his bid, he will never get it back in. This phenomenon is called the *ratchet effect*; as with a ratchet, bid prices can only go down but never up. Consequently, the building contractor has to put a bit of air between his bid and his indifference price as long as he is not really certain that the definitively last round of bids has begun.

The problem is the opposite for the company. Because it is not subject to public procurement law, it cannot use the effects of a legally prescribed final round of bids. When it holds a "final round of bids" as a private enterprise, then all bidders know that they cannot really believe that it is final. Based on their experience, instead they assume that subsequent negotiations will follow even after a "final round of bids". It has been confronted with this problem for weeks; it knows very well that all submitted bids still have a fat margin, which it is not willing to pay.

Against this background, the company invites all bidders to a Dutch auction. This will take place on the Internet and start with a bid price of 7.9 million euros. The request price will increase by 100,000 euros every 10 minutes. Whoever confirms a price first will get the contract. The building contractor again calculated an indifference price of 8 million euros. However, he was not able to get any other orders over the past weeks, and he does not have a lot of orders on his books since he lost the public call for bids. At which price do you think he will confirm the Dutch ticker?

The bidding strategy is similar to that in a first-price-sealed-bid auction

It is intuitively clear that the bidding strategy in a Dutch auction is related to one with a first-price-sealed-bid auction. In both cases, you have to consider a strategic margin in addition to the indifference price, because the winner has to accept the price he bids. The strategic margin is determined by your assessment of the competition and your own risk aversion in both cases. But there is one aspect that makes a difference between the two auction forms.

This aspect comes from the bigger game.[12] For example, if our building contractor submits an attractive offer for building a cafeteria, then this price[13] can be used against him in the next call for bids. The ratchet effect has effects beyond the awarding of an individual job. The bidders are aware of this and consider this risk in their strategic margin. This effect is called the *information exposure problem*, because bidders hesitate to disclose information about their best possible price level if they expect additional contracts to be awarded.

This is in turn a problem for the auctioneer, because he has to pay this risk margin. But bidders find it a lot easier to agree to a low cost level if at the same time they can be certain of getting the current job. This is precisely the case in the Dutch auction. The bidder knows there at the moment, at which the ticker reaches his bid, that he has the job and that nobody else has confirmed before him. He wins the auction if he confirms then. That makes his risk easier to calculate, because he has at least received the equivalent value in the currently won job. This is not the case in a first-price-sealed-bid auction where he discloses the information in any case, regardless of whether he wins or not.

Two variants of the Dutch auction: "full-step" and "sudden-death"

Of course, there remains a certain risk of information exposure due to the possibility that two bidders could confirm exactly the same ticker increment. Due to this risk, purists demand that a Dutch auction should be held in its *sudden-death variant*; once a bidder confirms the ticker increment, then the auction is closed for all other bidders at that moment. The current ticker increment cannot be confirmed anymore either.

This method eliminates the problem of information exposure completely. But there are aspects that speak against this method and for the selection of the *full-step variant*. In this, each bidder has time to confirm during the complete ticker increment even if another has already confirmed it. If then in fact more than one bidder confirm the same ticker step, all those bidders participate a final *tie round* that might be performed as a first-price-sealed-bid auction.

One argument in favor of this is that bidders with bids that are close to each other should have a second chance. No bidder has something against rethinking his strategic margin after getting an impression of the competitors.[14] On the other hand, the risk that a second bidder confirms the same ticker increment is to be assessed as much less than certain information exposure in a first-price-sealed-bid auction. Many bidders even find the sudden-death variant as representing questionable

behavior if perhaps seconds decide who gets the job for orders worth several million euros.

Finally, the problem of information exposure cannot be eliminated completely either with sudden-death logic in the actual practice Internet auction platforms.

The signal on the Internet always needs a certain time for transmitting the bid confirmation of a bidder to the auctioneer and to close the auction to the other bidders. The case of two confirmations received within this signal run-time cannot be excluded in a sudden-death variant of a Dutch auction on the Internet. The operators of Internet auction platforms like to offer the solution in such cases of reading the log file and deciding on the basis of the time stamp of the first received signal. But this does not solve the problem completely, because the information exposure problem is not eliminated in this case.

Against this background, it seems to make more sense in actual practice to accept a small problem of information exposure and prefer the full-step variant of the Dutch auction. This can be held very well even without an Internet platform, for example, by fax, phone or e-mail. When it is a question of high-volume orders, many bidders consider this more trustworthy than an auction on an Internet platform.

What would be your decision?

In the context of the construction of a new power station, a utility company awarded the complete turbine complex to one single turbine supplier. By purchasing all turbines from one single supplier, they hoped to be able to reduce costs for operation and maintenance of the complex site. The final decision in favor of one of the only two suppliers worthy of consideration was reached by a Dutch auction. As the business volume was a big two-digit million Euro figure and one did not want to expose both esteemed business partners to a cultural shock, the auction was executed as *physical simultaneous negotiation* on site.

Both suppliers were invited to the headquarters of the utility company and ushered to separate rooms from where they were able to participate in the auction. Of course they didn't know how many other bidders would be taking part in the auction in total. Already days in advance, the rules of the auction had been communicated, including an exact table of ticker steps of the auction. Thus, the bidders knew already quite ahead of time which price step might be confirmed in the morning between 8:00 and 8:15 a.m., which between 8:15 and 8:30 a.m. and so on. Every bidder had a dedicated advisor of the utility company at his side to whom he could signal his willingness to confirm a price step at any time. For the official, binding

offer, a physical bidding sheet was prepared which was to be completed with the price step concerned and which had to be signed by the bidder. After every ticker step, a short telephone conference between the advisors of all bidders took place in order to clarify if one of the bidders actually confirmed the last price step. In that case, the auction was to be declared as finished. For the case that more than one bidder had confirmed the last price step, the execution of a tie round as first-price-sealed-bid was communicated. If no bidder confirmed the price step, the next ticker step was to be awaited and the next telco took place 15 minutes later.

In reality, only one telco took place, after the first ticker step that had been running from 8:00 to 8:15 a.m. The bidders had just arrived and been accompanied to their rooms when the first ticker step took place as announced. To both bidders, this was unmistakably explained again by their advisors at 8:00 a.m. In fact, one of the bidders had already prepared his bidding sheet for the first-price step and handed it over to his advisor. The other bidder, however, did not even talk to his advisor about the possibility of confirming the first ticker step. So after the first telco it was clear that the multi-million project order was going to the bidder that had confirmed the first-price step. After that a scenario followed which none of the participants expected.

When the bidder who did not place any offer learned about the end of the auction, he suddenly claimed that he had actually been willing to confirm the first-price step, too, that he had not even been offered a coffee yet and that it had not been clear enough to him that the auction had indeed already started. This brought the utility company into quite a precarious situation: Should they accept the offer belatedly, even after already declaring the other bidder to be the winner of the auction? What would be your decision? What do you think was the strategy of the bidder leading to this situation? In Chapter 10 we will come back to this question and explain the proceeding in this interesting case.

5.5 Bidding in a sealed exchange of bids

In my game theory negotiation seminars, I conduct a number of experiments at regular intervals, with which the participants can try out the mechanisms of various negotiation forms. The success of negotiations is added up for all experiments, and the winner receives a bottle of choice red wine at the end of the seminar.

One of these experiments is a sealed exchange of bids. The participants exchange bids in pairs and receive the corresponding points if their prices intersect, and no points if they do not intersect. A sealed

exchange of bids perfectly represents the stalemate situation of two symmetrically opposed negotiation partners, who are negotiating for pie shares.

Consequently, it pays to analyze this more precisely from a game theory viewpoint.

A game without a unique Nash equilibrium

In the experiment in my training sessions, one participant plays the seller, who does not want to sell his item for a price lower than 50. Another plays a buyer, who would buy the item for 150 at the most. To simplify the situation, both of the test subjects know the indifference price of the other. Consequently, both know that it is simply a question of dividing up a pie with the size 100.

In other words, the situation is symmetric. Both players now have numerous options. Any number between 50 and 150 can be noted on a slip of paper as the demanded price. The seller has to decide whether he will tend to demand a high price or wants to grant a low price. The situation is the opposite for the buyer: He can either demand a low price or accept a high price.

As representative for all low prices, let's take the option "70" and for all high prices "130" (see Figure 5.2). If both select the option 70, then the transaction is concluded at a price of 70. The seller receives 20 points, which is the difference of 70 to his indifference price of 50, and the buyer receives 80 points, which is the difference of 70 to his indifference price of 150. If both select the option 130, then the transaction is concluded at a price of 130, and the points are divided in the precisely opposite manner. If the seller grants a price of 70 and the buyer a price

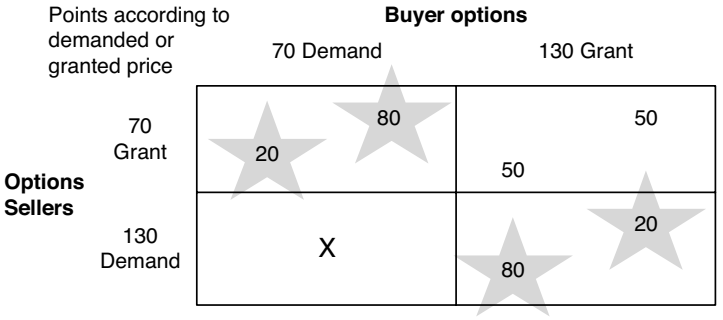

Figure 5.2 Payout matrix of a sealed exchange of bids

of 130, then the average is taken; the transaction is concluded at a price of 100, and both receive 50 points, that is, half of the pie sized 100. But if both demand the larger share of the pie, then neither gets anything.

The sealed exchange of bids is an example of a simultaneous game. We have already gotten to know a simultaneous game with the prisoner's dilemma and consequently the concept of Nash equilibrium.[15] Remember: A Nash equilibrium is a combination of the alternatives of all players, in which no individual player can improve his position by selecting deviating behavior as long as all others behave in that Nash equilibrium. Consequently, it is mutually the best answer.

Game theory teaches us that if the rules of a simultaneous game permit a unique Nash equilibrium, then it is rational for all players actually to play this Nash equilibrium. The prisoner's dilemma has such a unique Nash equilibrium. Unfortunately, games in general do not need any Nash equilibrium or can also have several Nash equilibriums parallel. Then it is no longer that easy for game theory to predict the behavior of players definitively and to recommend behavior to them.

Based on the payout matrix in Figure 5.2, we see that both behavior combinations at the top left and the bottom right are two Nash equilibriums. Neither of the two can improve his position by deviating from this behavior combination if the other plays it. For example, at the top left: The buyer gets 80. If he instead grants a price of 130, then he only gets 50, that is, less. The seller gets 20 at the top left. If he changes the strategy and demands 130, then the prices do not intersect and he gets 0. The behavior combination at the bottom right is also an analog Nash equilibrium. Consequently, we are not in the fortunate situation of the prisoner's dilemma, in which exactly one Nash equilibrium exists and this can also be predicted as the behavior. Another difficulty is that the two Nash equilibriums of the sealed exchange of bids are both equally attractive or – to put it more precisely: The one Nash equilibrium is more attractive for the seller (at the bottom right) and the other for the buyer (at the top left), whereby the attractiveness is at the same high level in both cases (80). Game theory reaches its limits there, because you cannot predict with two equal Nash equilibriums which of the two the players choose. (But please do not think now that each simply chooses "his Nash equilibrium". That would not produce intersecting prices either: bottom left).

Relation to first-price auction

Even if the analysis of the Nash equilibrium cannot solve the impasse, the two negotiation partners still name a number at some point in a

sealed exchange of bids. In the first seminars that I held, I discovered that the prices almost never intersected. The participants usually explained that they had consciously pushed their luck and submitted a bid that was far from their own indifference price. This gave them a chance for a big piece of the pie, for which they readily took the risk of not getting anything. As a result, I changed the rules of the experiment. Negotiation pairs, whose prices did not intersect, not only received no points in the running for red wine, but they were also completely disqualified from the contest.[16]

As a result, the risk aversion of the participants increased suddenly, because nobody wanted to risk being disqualified simply to win a few extra points. The prices almost always intersected with the new rules.

The bidding strategy of a seller apparently entails adding a strategic margin to his own indifference price (or to subtract it in the case of a buyer), in that he considers his own risk aversion as well as his assessment of the indifference price and risk aversion of his counterpart. Analog to a first-price auction, the following thus applies to the optimum bidding strategy in a sealed exchange of bids: *To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own risk aversion and your assessment of the other person*. The lower you assess the risk aversion of the other person and the further away you estimate his indifference price to be, the bigger the strategic margin is that you can select.

The strict rule that prices not intersecting result in a breakdown of negotiations has an essential effect on the result in this. This is the only factor that causes the two negotiation partners to act reasonably and try to prevent this scenario.

In actual practice, that is precisely the challenge of a sealed exchange of offers. There is usually nothing that forces both negotiation partners to forego the transaction for once and for all when prices do not intersect. As a person in charge of a seminar, I can give zero points or even dictate exclusion from the red wine contest. But the temptation is very large in actual practice to continue negotiating anyway, which goes against the idea of a sealed exchange of bids.

5.6 Bidding in an ultimatum game

You certainly remember the automobile component supplier, who gave his American joint venture partner a TIOLI.[17] You most certainly wondered why he cited exactly 200 million euros as ultimatum. He could have also said 151 million euros; that still would have been better for the Americans than the alternative (150 million euros).

There are two reasons against making such extreme demands in an ultimatum game.

For example in this case of a planned joint venture, all considered values involved uncertainties. Nobody could say exactly whether the whole pie that would be created would really be worth 500 million euros or somewhat more or even less.

In the same way, the assessment of the alternative is based on certain assumptions. To be certain to represent the better alternative for the Americans, the German company had to place its offer with a certain safety margin to 150 euros. To differentiate it by only one million euros would have been risky.

Independent of this aspect of assessment uncertainty, there is also a second aspect. The experience with TIOLIs in price and other contract negotiations between entrepreneurs shows that you should not push things too far. Exactly where the limit of the acceptable is depends strongly on the context, the culture and the economic situation of the negotiation partner. In any case, the person or company accepting the offer may not be made to look like a fool. The critical limit for acceptance is usually between 5 and 20 percent of the pie. I have found this rule of thumb valid both in my negotiation practice and in numerous experiments in my training sessions. The limit might be set somewhat higher for companies from southern Europe or the Far East, while the game with an American company can be played out further as a tendency. The reason for this might be that game theory is part of the basic business education at colleges there. Against this background, the offer of 200 million euros (the share of 50 million euros of the pie in excess of 350 million equals 14.29 percent for the American company) is even very conservative.

The credibility of the threat is decisive

Let's imagine that a hostage-taker has a bank employee in his power. His planned robbery of the bank has failed, and now he is held up in the service counter area and demands one million euros ransom. The subsequent negotiations between him and the police are long and drawn out, nerve-racking and characterized by the psychological art of negotiating. From a bargaining theory viewpoint, it is a question of an ultimatum game.

The question is what happens when the deadline for the ultimatum passes. The bank robber threatens to kill his hostage if his demands are not met. In bargaining theory terms, he is arguing with a dramatic shift of the threat point. If negotiations fail, then not only do both parties

get "nothing", but the hostage also loses his or her life. But he can only create this dreadful scenario if he puts his own life on the line, because the police will consider shooting him in an attempt to free the hostage. Consequently, the threat point is at very much negative spot for the hostage-taker (see Figure 5.3).

The term *brinkmanship* has become established for this negotiation tactic. This denotes negotiations, in which one or both negotiation partners act at the "brink of disaster" with their threats. Another example of brinkmanship is if you demand a pay raise from your boss and threaten to quit otherwise. The term was created in the context of the "Cold War" when both sides threatened a devastating nuclear war.[18] The Cold War ended relatively well for all of us. However, whether brinkmanship is to be recommended in salary negotiations with your boss is something that each person must decide for himself.

A strategist does not play with dice. Or does he?

Nobel prizewinner Thomas Schelling suggested another strategy to underline the credibility of the threat scenario. This is the *trembling-hand-concept*[19] which is based on *randomized strategies*.

Randomized strategies are distinguished by the fact that individual players are not forced to choose directly between alternatives. Instead, a player can decide consciously to take an alternative by chance. Tennis

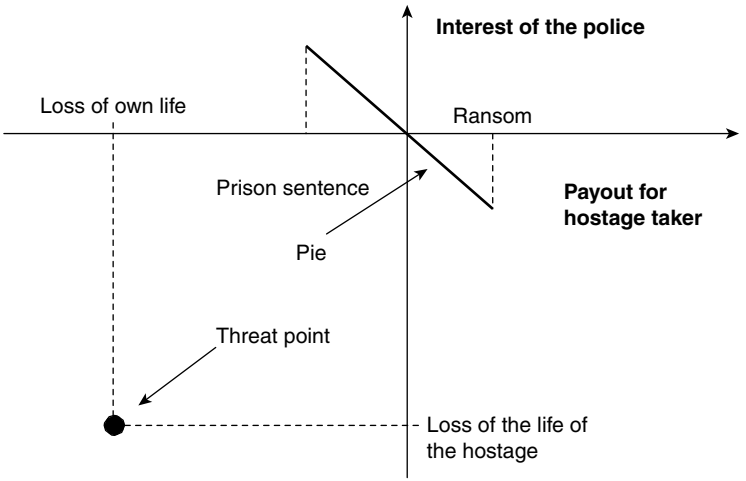

Figure 5.3 The pie in the negotiations with the hostage-taker

players use this strategy for their serve. Even if the strength of the server is to hit down the line or the weakness of the opponent is the backhand, the server will choose to serve to the other side now and then by chance. He can only continue to surprise his opponent in this way. Formally, a randomized strategy consists of splitting the probability between the original alternatives. This conscious decision then takes the role of an alternative in turn; the player has the choice between very many alternative splittings of probability. For example, he can choose the first alternative with a probability of 0.3 and the second with a probability of 0.7. New Nash equilibriums can be created through the consideration of randomized strategies, which might be more attractive for all players. But this concept is of rather theoretical nature in the case of bilateral negotiations. In actual practice, there is hardly any negotiator who is willing to let a throw of the dice decide his negotiation strategy.

However, Thomas Schelling advised using the trembling-hand concept when dealing with dictators or psychopaths. He reasoned that the effect of an ultimatum increases dramatically if the person, who makes it, presumably has a randomized strategy. It suffices solely to connect the binding character with a certain degree of probability. The ultimatums of a hostage-taker are not taken seriously if he does not make good on his threats. It is then too obvious that he also values his own life. But if a patient file for him is suddenly found which discusses his psychological instability, his threats are suddenly taken seriously again. If he goes berserk, he can be capable of anything including very irrational acts. This alone greatly increases his chances of having his ultimatum met. The negotiating position of someone who can be expected to act rationally is much worse.

Schelling derived a recommendation for rationally acting negotiation partners from this observation. He recommended really carrying out your threats from time to time to prove that you will make good on your threats with a certain probability.

Both brinkmanship and the trembling-hand concept are very risky methods to stress an ultimatum. Please do not consider linking both strategies. It is safer in price negotiations to try to find a real alternative and use the competition argument. This brings us back to the auctions which will be the subject of the next chapter.

5.7 Summary

The rational bidding strategy in an English auction is *to bid precisely to your own indifference price and then give up*. The rational bidding strategy

in a second-price-sealed-bid auction is analog: *To bid precisely your own indifference price*. The rational bidding strategy in a first-price-sealed-bid auction is *to include a strategic margin in a bid on the basis of the indifference price, which takes into account your own risk aversion and your assessment of the competition*. The term strategic margin can be applied meaningfully to both the seller and the purchaser for this. The rational bidding strategy in a Dutch auction is the same as in a first-price-sealed-bid auction. But the strategic margin tends to be smaller there, because the bidder does not have the problem of information exposure.

The rational bidding strategy in a sealed exchange of offers is *to include a strategic margin in a bid on the basis of the indifference price, which takes into account your own risk aversion and your assessment of the other person*. In this, the seller adds the strategic margin to it, and the buyer subtracts it.

In an ultimatum game, a price can often be achieved that is far-removed from your own indifference prices as long as you do not push things too far. The strategy of brinkmanship underlines the ultimatum by using a catastrophic (for both sides) threat point. Someone using the strategy of the trembling-hand underlines it by consciously playing with the risk of irrational behavior.

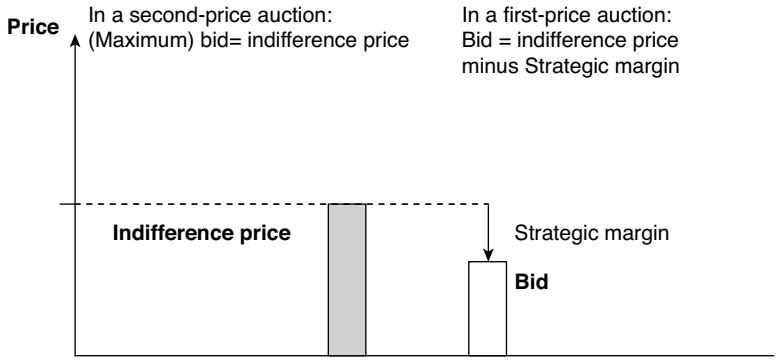

Figure 5.4 Bidding strategies in first- and second-price auctions (sale logic)

6
Winner's Curse in an Auction

6.1 Auction objects with "common value" or "private value"

The classic example of common value is represented by oil fields which are auctioned to private oil companies. One of the famous cases is that of the Chinese oil company Natural Petroleum Corporation which had to pay an exorbitant price at the auction of oil drilling rights held by Venezuela in 1997. This is the background.

The value which the various bidding oil companies attribute to a new oil field is essentially dependent on the supposed capacity of the oil resources. But nobody can say in advance how large this oil volume really is. Although the methods are improved continually, oil companies are still dependent on a few trial drillings for predictions even in times of geologic ultrasound analyses. The risk of faulty estimates always remains. The oil field can actually be larger than predicted, but also smaller. Trial drillings entail the danger that the drilling might be in the richest part of the oil field and consequently provide false assumptions about the surrounding area.

As a result, the valuation of an auction item is characterized by a large degree of uncertainty; a "pig in a poke" is offered in the bidding, to use an old saying. In addition, the capacity of an oil field represents information that all bidders need for their calculations. If the oil field is larger or smaller, then it affects each bidder in the same way. All bidders have the same plans for the oil field: To extract the oil and sell it. Consequently, the *real value* of the oil field is the *same* for all bidders.[1] We speak about a *common value* in this case.

The real value of the bidder (the auction item for the bidder) is that value which the bidder would actually consider his indifference price

with the hypothetical receipt of all imaginable information. He often only knows how to estimate the real value of an auction item years later, for example, when he knows the further development of the market in question.

The indifference price is always only the best estimate which a bidder can assume to be the real value with all the information available to him.

In Venezuela, all bidders had the chance to make a trial drilling. We can assume that the average value of the drillings of all bidders produces a better approximation of the real value than the individual drillings. But if the real value was close to the average value, this means that the one with the highest yielding drilling and the highest estimate certainly overestimates the oil field capacity. Although all bidders were to estimate the same real value, they calculated different indifference prices.

In this example, the auction took place using a first-price-sealed-bid auction held by Venezuela. The following effect was produced: The one who submitted the highest bid was the one who had gotten the highest yield from the trial drilling and, consequently, had miscalculated most to their own disadvantage. At the moment when the winner of the auction was announced, the winner had to have understood that the other bidders must have had poorer yielding drillings. It might even only understand this years later. In any case, the oil field produced a lower yield than it had estimated. This effect is appropriately called *winner's curse*.

Another common value example

A European railway company awarded a contract for renovating the glass roof of a railway station hall. The complete glass roof was composed of thousands of individual panes. Each of these individual panes could have been damaged in various ways from spraying with graffiti and small scratches to blindness effects and cracks. Depending on the condition, a decision had to be made about which measures to take. This ranged from simple cleaning to complete replacement of the pane.

Nobody, neither the bidding construction companies nor the railway company, could know in advance how many individual panes were in precisely which conditions. It was especially not clear what amount of work had to be calculated for renovating the glass roof. Determining this information was already connected with costs. The bidders were each given the chance to examine a random sample of individual panes at their own expense to be able to estimate the different conditions and their frequency. This is a very nice, traditional situation of common value.

An example of a pure private value situation

Imagine that Greenpeace would take part as a bidder in an auction for an oil field in Alaska. The plan of Greenpeace would not be to exploit the oil field and earn money with it. Instead, if Greenpeace won the auction, it would ignore the oil extraction rights and declare the area to be a wildlife refuge. As a result, the value that Greenpeace attributed to the auction object would not depend on the oil market and above all not on the capacity of the oil field. The sole factor that would determine the value for Greenpeace would be the ecological quality of the area, a factor that interests the bidding oil companies very little. Even if the described scenario is unfortunately of a rather hypothetical nature, it would be a purely private value situation for Greenpeace.

Valuation questions for auction items – both in sales and purchasing auctions – are often based on estimates of future markets. These questions are always characterized by a certain degree of estimation uncertainty, because nobody can predict the future for sure. In addition, most have a common value character, because the same markets are involved that different bidders make their estimates on. Consequently, most auctions are characterized more or less strongly by the danger of winner's curse.

6.2 Avoid winner's curse?

If you auction old things from your attic, then winner's curse is perhaps the best thing that can happen to an auctioneer. Let the winner curse as much as he wants once he has the thing in his hands. As long as you didn't say anything false in describing the item and its condition, you can certainly be pleased if bidders get into a frenzy of bidding and one has to pay you a lot of money in the end. But is that really the right thing to do?

In general, auctioneers should be very interested in how things go for the winner of an auction with the concluded contract. For example, this is very important in a purchasing auction, the auction object of which is a supply contract important for the continued existence of the supplier's business. No buyer is interested in concluding a contract with a supplier, whose business becomes in danger of closing. He should be even less interested in it if the conditions of his own contract contribute to that.

Winner's curse was avoided with a relatively simple measure in the mentioned glass roof job.[2] The railway company forced all bidders to disclose their analysis results of the roof condition. Overall statistics of all random samples were generated and given to all bidders. This is

the best thing you can do in preparing an auction with common value character; make certain that all bidders have the same amount of information. In general, you unfortunately cannot rely on the information made available by the bidders, because the incentives for manipulation are too great. But the railway company was in the fortunate situation of being able to make random checks of the analyses.

The English auction can work against winner's curse

Another chance for exchange of information between bidders is the English auction. Namely, when the bidders learn the indifference price of their competitors, they can draw conclusions about the relative situation of their own indifference price. A cautious bidder is prepared to *correct his own indifference price during an auction*. He should think about that if most bidders already give up far from his current indifference price.

Consequently, an English auction provides the chance to exchange information between bidders and helps to avoid winner's curse. But how this exchange of information takes places depends very much on the design of auction dynamics. For example, it is not clear how you can really observe in an English auction whether and when other bidders have dropped out. One bidder might only be waiting until the price is close to his indifference price and then suddenly become involved in bidding again.

To really avoid winner's curse, however, the auction must make the information available to other bidders about how many bidders have already dropped out. Bidders should question auctioneers about whether and how this information is provided.

The quality of an English auction to avoid winner's curse has a critical component for a profit-oriented auctioneer. The observation, which is surprising for many, is namely that an English auction actually produces a lower price for the auctioneer in a common value situation than sealed auctions, for example. In my auction training sessions, I conduct an experiment at regular intervals, in which the participants are put in a real common value situation and first bid in a first-price-sealed-bid auction and then in an English auction in the same situation.

Winner's curse occurs in nine of ten cases in the first-price-sealed-bid auctions, while the English auction produces a more conservative result.

Consequently, avoiding winner's curse means for the auctioneer that he gets somewhat lower prices. He has to consider very well how much

he is interested in the fate of the winner and how much it is worth to him to avoid winner's curse.

Proxy auctions – elegance with risk

A variant of the dynamic English auction is the *(ascending) proxy auction*. Bidders are given the chance in them to lodge a maximum bid with the auctioneer.

This maximum bid is not understood as an immediately submitted bid. Instead, the auctioneer tries to increase the associated actual bid acting on behalf of the bidder. This goes on until the associated bid is just higher than a bid submitted by another bidder by the demanded minimum increment. The deposited maximum bid is thus a "proxy bid". We have already seen that proxy logic in used at eBay.[3]

That is very elegant at first glance. But it entails the following danger at the time: A bidder who has submitted a maximum bid can no longer correct it downward anymore. But if many other bidders drop out before him, then he might reduce his indifference price based on this information. If his new indifference price is below the already submitted maximum bid, he might have a problem. There is substantial danger that he could win the auction and must pay the price, which is higher than his (new) indifference price. The idea behind a proxy auction is actually that the bidders should each submit their indifference prices as maximum bid to speed up the process. A correction of the indifference price upward is quite possible. But a correction downward is made impossible by the proxy logic. In turn, it is precisely that which eliminates the effect of avoiding winner's curse.

6.3 The English ticker auction

A plastic injection molding company bid for production of a plastic part scheduled to be used for years in serial production at its most important customer. The value of the order amounted to several million euros. Calculation of the project was characterized by a great deal of market uncertainty. The prices of synthetic granules, the most important raw material, were not stable and their future rate was difficult to calculate. As a result, there was danger of winner's curse.

The customer had requested three other companies to submit bids. All four were invited to a purchasing auction. This took place as a dynamic English auction on an Internet platform. Such auctions usually do not last more than a few hours. How long do you think that the plastic

injection molding company needed to adjust its calculation when it learned the prices of its competitors?

Scenarios such as this are common in many industries these days. In the automobile industry, individual orders with a total value exceeding one billion euros are negotiated over the Internet in dynamic English auctions. Final price negotiations seldom last more than one day in such cases.

The experiences which suppliers have made on the sales side show that only very few bidders are able to influence their calculation in such a short time. In the better cases, a bidder knows his own indifference price and uses the "no-brainer" strategy consistently: "To bid precisely to his own indifference price and then drop out."

But the more important an order is for a bidder, the more difficult this disciplined behavior is. A dangerous inherent dynamism of the bidder team is often created in the critical hours of an auction which tends to result in a chaotic formation of prices. In the worst case I have experienced, a member of the sales force reduced the price once again at the end "at his own responsibility". This procedure was even rational from his personal viewpoint; if he had lost the order, his job as personal consultant of this customer would have become superfluous. The result of the calculation of his employer really only had secondary priority for him.[4]

But a more serious matter is that the theoretical sense of an English auction is lost even in a "better case". In an auction with indifference prices that do not change, an English auction is simply only equivalent to a second-price-sealed-bid auction.

The chaotic formation of prices on the bidder side could be avoided effectively with it and would produce exactly the same result. But the English auction generates information for the bidders which they need to revise their indifference prices. Winner's curse can only be avoided with that.

The English ticker: design of auction dynamics without inherent dynamics

But to revise their indifference prices, bidders need time. Normally, a new indifference price must be agreed upon with controlling and management. There are hardly any sales organizations that can do that hourly. Consequently, a variant of the English auction is recommended that provides the bidders with more time.

In an *English ticker auction* (also called a *Japanese auction*), the bidders do not submit bids with freely selectable prices, but instead the auctioneer

asks who confirms his bid at a certain price. All bidders, who confirm their bid at the current price, remain in the auction, and all others are excluded. The auctioneer reduces the price called out (in purchasing logic; he increases it in sales logic) until one last bidder remains (see Figure 6.1).

The big advantage of an English ticker auction for the auctioneer is that he switches off the dynamics and controls the temporal course of the auction himself. As a result, he can give the bidders exactly as much time for revising their indifference price as he considers necessary. The bigger the uncertainties in a common value and the more complex calculations for valuating an auction item, the more time he should grant to bidders.

In awarding contracts with a volume in the ranges of millions, it can make a lot of sense to let an English ticker run for several weeks, for example, with only one price step per day.

Each step is a prisoner's dilemma

From a theoretical viewpoint, each individual price step in an English ticker is a prisoner's dilemma. The bidders have to decide whether they want to remain in the auction or would do better to drop out. It is a question of a variant of the "competition prisoner's dilemma". For each bidder, the difference between his indifference price and the current price level is the margin remaining for him. He has the choice at each ticker step of whether he wants to give up part of his margin or whether he instead

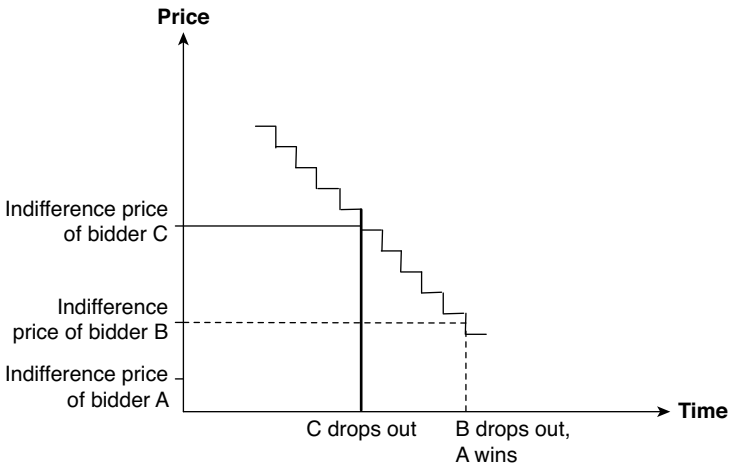

Figure 6.1 Sequence of events in an English ticker auction (purchasing logic)

gives up the auction item or his chance to get it (see Figure 6.2). If all bidders dropped out at the same step, then all would still have a chance to get the item, because the auction would end without a clear winner.[5] If all bidders give up part of their margin in a further step, the chance for each one to get the item remains the same as previously, but with a reduced margin. But if one single bidder does not go along with this step, he is excluded from the process and has no more chance to get the item. On the other hand, if only one bidder gives up part of his margin in this step, he wins the item. According to the prisoner's dilemma, the result is: All bidders go along with the step as long as they still have margin to give up or their indifference price has not been reached.

The fact that it is a question of a chain of repeated ticker steps does not turn an English ticker auction into a "repeated prisoner's dilemma" with the option of coordination among players;[6] in an English ticker, those who decide to drop out do not participate in the repetitions anymore. They are excluded from the running for the auction item for once and for all.

But the prerequisite for conscious parallel behavior is that all players are still involved even in the repetition. So each ticker step is a one-shot game and, consequently, a prisoner's dilemma, which normally works very well.

The English auction avoids winner's curse

The big advantage of an English ticker auction for the bidder is that he can prepare for the course of prices in the auction and already knows days in advance when his own indifference price will be reached.

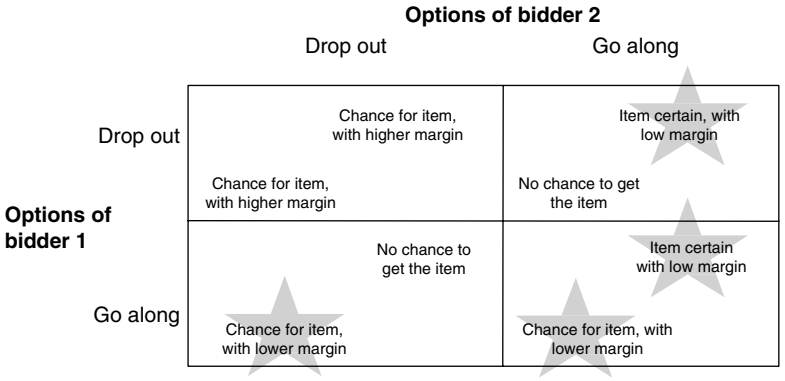

Figure 6.2 A ticker step as prisoner's dilemma

Consequently, he can prepare his internal decision-making process carefully to process information gained from the auction. This makes a more genuine formation of prices on the bidder side, which in turn an auctioneer should appreciate as an advantage.

However, there are several variants with respect to the information which the bidder is provided after each ticker step. The bidder must at least know after each ticker step whether he has won or whether there are still other bidders, who have also confirmed the ticker step. A very popular game is only to tell the bidder each time that there is at least one other competitor in the auction – as long as that is the case. This information suffices for the complete rationale of the prisoner's dilemma. The bidder will also confirm the next step as long as his indifference price has not been reached. How many competitors are still bidding is not important for this case.

But the following should be noted with this variant: It does not help to avoid winner's curse yet. The individual bidder does not have any chance to learn about the dropping out of his competitors in a ticker auction of this variant in order to correct his indifference price upward (in purchasing logic). Instead, use of this message in common value situations also employs the philosophy that all bidders take a conservative indifference price from the start when winner's curse is threatened. They should only correct their indifference price downward due to the additional information obtained in the auction. The argument assumes that bidders have a high degree of experience with auctions and game theory. But this cannot always be observed in actual practice. To provide less experienced bidders with the information that they need to correct their indifference price possibly upward, the number of remaining bidders must be told after each ticker step. In other words, you count down the number of bidders still in competition. This is the only auction form in which winner's curse is effectively avoided.

6.4 Summary

The real value of an auction item is the value which a bidder would attribute to an auction item if he had all possible information about the item. The real value can differ from bidder to bidder, for example, if they want to use it for different purposes. If the real value is the same for all bidders based on the nature of the item, we call this a "common value".

The indifference price of a bidder is the best estimate based on all available information of its real value and consequently the price which he would pay maximum for the item.

If bidders have a great deal of uncertainty in an auction with common value character, there is a threat of winner's curse. To avoid that, you need information about the price level of the competition and must have a chance during the auction to correct your indifference price.

An English auction provides bidders with this information. The English ticker auction also ensures that bidders have sufficient time to work on their indifference price.

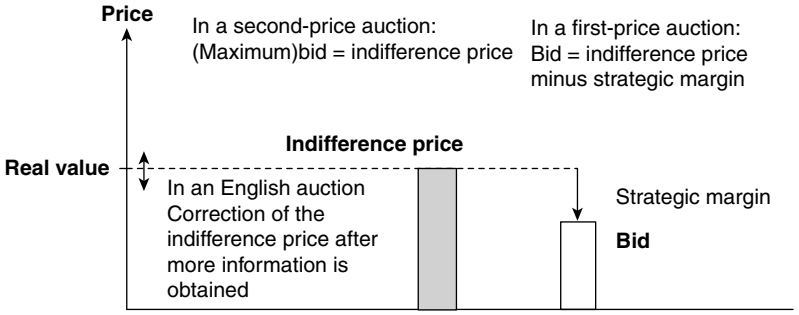

Figure 6.3 Bidding strategies in first- and second-price auctions (sale logic) with common value

Part III
Auction Designs

7
Selection of an Auction Form

7.1 The balance between first- and second-price auctions

Why did the company for awarding the cafeteria construction project[1] select a Dutch auction as negotiation form? It is not very easy for an auctioneer in individual cases to decide which of the four auction forms produces the best result. The Dutch auction essentially provides the same result as a first-price-sealed-bid auction, that is, the highest bid in the form "indifference price plus strategic margin". On the other hand, a second-price-sealed-bid auction and an English auction are second-price auctions. They both provide the second-best indifference price as final result.

But which of these two results is the better one? This depends on whether the strategic margin of the bidder with the best indifference price is bigger or smaller than the difference to the second indifference price. If it is smaller, then the bidder with the best indifference price wins in a first-price auction. His price is then lower than in a second-price auction. Consequently, a first-price auction is better than a second-price auction in this case (see Figure 7.1).

But if the strategic margin of the bidder with the best indifference price is bigger than the difference to the second indifference price, the result of a first-price auction is higher than the second best indifference price.[2] Then a second-price auction is better for the auctioneer than a first-price auction (see Figure 7.2).

Do all auction forms provide the same result in the expected value?

An especially neat insight of auction theory is the *revenue equivalence theorem*.[3] It states that the expected price achieved with *any auction*

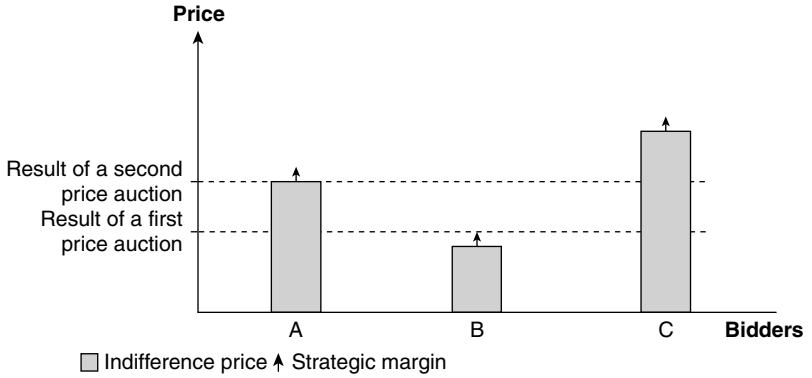

Figure 7.1 Situation of a purchasing auction, in which the result of a first-price auction is better

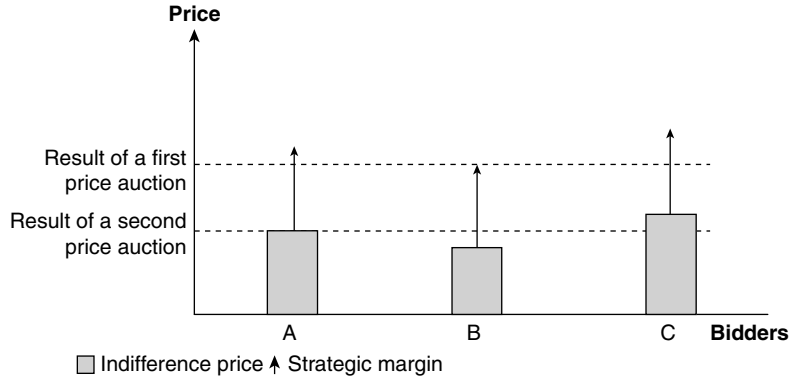

Figure 7.2 Situation of a purchasing auction, in which the result of a second-price auction is better

form is the same under certain circumstances. However, these prerequisites are relatively strict. Essentially, all bidders must be risk neutral, the indifference prices of the bidders must be statistically independent and the auction item must have a private value character. In other words, the theory says the strategic margin of the best bidder corresponds on the average to the difference to the second indifference price in many theoretically held auctions. The prerequisites of the theory are almost never fulfilled in actual practice. As Milgrom very appropriately

noted: "One important use of the revenue equivalence theorem is as a benchmark for analyzing cases when the assumptions of the theorems do not hold." (*Putting Auction Theory to Work,* p. 77*)*

That is precisely the essential point in actual practice: The way in which the prerequisites of the revenue equivalence theory are not fulfilled in individual cases answers in a reversal conclusion which auction form is better. There are roughly three rules:

- The more risk averse the bidders are, the lower their strategic margin. This speaks in favor of a first-price auction. If the bidders are more willing to take risks, this recommends a second-price auction.
- The more asymmetric the statistic distribution of indifference prices, the greater the difference to be expected between the first and second indifference price. This also recommends a first-price auction. But if indifference prices can be expected to be closer, this speaks in favor of a second-price auction.
- The more pronounced the common value character of an auction item is, the greater the danger of winner's curse. Then an English auction should be considered which avoids winner's curse. If an auction item has a pure private value character, then a sealed auction can be held.

In the example of the cafeteria construction project[4], the company assumed that this job would have high strategic significance for the bidders. Consequently, it expected risk-averse bids. In addition, the bidders submitted bids with very different price levels in a preliminary stage. Both of these factors speak in favor of a first-price auction.

The company also assumed that the building contractors requested to bid could estimate the job with a high degree of calculation certainty. Consequently, it did not see any special danger of winner's curse with this order. As a result, it decided against holding an English auction with the bidders. In the end, a Dutch auction made the binding nature of the decision to whom to award the job clearer to the bidders for it as a private company than a first-price-sealed-bid auction.

The decision between first- and second-price auctions can rarely be deduced so compellingly as in the case of the cafeteria construction. Contradictory aspects often become apparent in the analysis of the competition situation of the bidders, which should be considered carefully. These situations are also cause for *hybrid* negotiation forms, which is discussed in the next section.

7.2 Hybrid negotiation forms

In actual practice, selecting the respectively optimum negotiation form in each individual case is a fine art. No negotiation situation is like another one, and every competition situation has its own characteristics. Different basic negotiation forms are even combined with one another to create a *negotiation design* in many cases. Many of these combinations have proved better than others and consequently are worth noting as *hybrid negotiation forms*. They can, in turn, be embedded as a component in more complex negotiation designs.

A relatively well known example is a hybrid auction form, which Paul Klemperer (one of the great auction theoreticians) first discussed. This *Klemperer auction* (he calls it an *Anglo–Dutch auction*) combines the characteristic of an English auction with the first-price character of a Dutch auction and consequently is very robust in many competition situations. It is a question of two sequential auction phases: An English ticker auction, which ends when only two bidders remain, followed by a Dutch auction between these two bidders[5] (see Figure 7.3).

If you are not certain in considering whether to use a first- or second-price auction, because there are reasons for both, then the Klemperer auction is the middle way to be recommended most. But its critical character is that it might produce a counter-productive signal for the two winners of the first phase if the third highest bidder drops out at a high level. If you want to avoid the threatened winner's curse, then that is even a desired effect. When in doubt however, in actual practice of purchasing auctions for large volume orders the person responsible for purchasing is more interested in seeing that the indifference prices of the bidders only move downward.

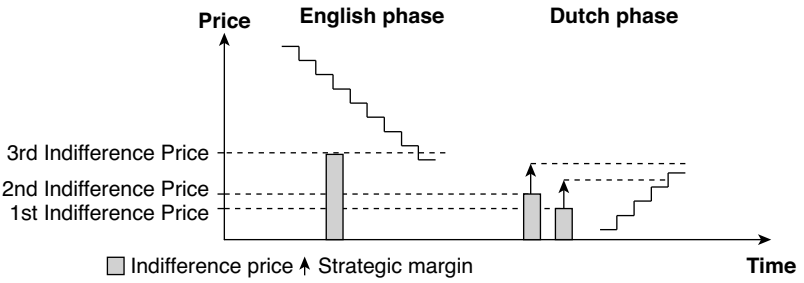

Figure 7.3 The Klemperer auction in purchasing logic

Then Klemperer auctions entail the risk that the two best bidders correct their willingness to bid upward when they see that the third highest bidder has dropped out.

The Hong Kong–Dutch auction: a classic which you should know

A further development of the Klemperer auction, the *Hong Kong–Dutch auction*, avoids this risk. The English phase is simply replaced by a *Hong Kong auction*[6] with two winners. Both then take part in a Dutch auction (see Figure 7.4).

A Hong Kong auction is a multi-unit auction[7] which runs similar to an English ticker, but with one decisive difference: The last bidder who drops out of the ticker is included among the winners. Especially, the ticker of the Hong Kong auction continues to the next to last bidder when two winners are sought. The information which each bidder receives after a ticker step, is not the counting down of the number of bidders (that would make it effectively an English auction), but instead the message, "There is more than one bidder still." Consequently, the bid of the "worse" winner determines the price of both winners.
Consequently, the result of a Hong Kong auction in private value situations is equivalent to that of Dutch tender auctions. In common-value situations, however, it provides bidders with the chance to correct their indifference prices downward.

In the context of awarding industrial contracts, Klemperer auctions and Hong Kong–Dutch auctions are becoming increasingly popular thanks to their universal characteristics. But these auction designs cannot be used in any situation without any problems. We will discuss a few examples of special situations which require other hybrid negotiation forms or individual negotiation designs.

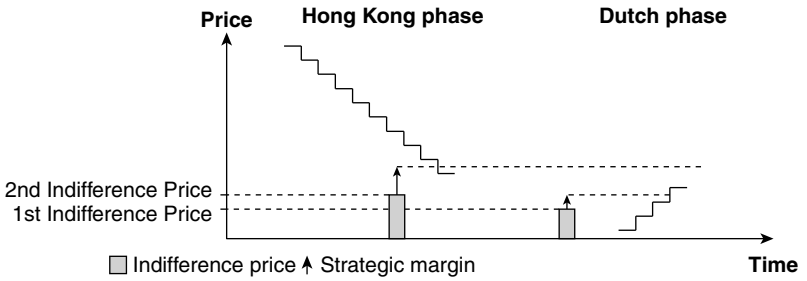

Figure 7.4 The Hong Kong–Dutch auction in purchasing logic

7.3 The exposure problem

I like to hold auctions about a ten-euro banknote in my auction seminars.[8] The auction rules correspond to those of a dynamic English auction, that is, the highest bidder pays his bid and receives the ten euros. In addition, however, the second-highest bidder pays his bid too. The minimum higher bid increment is set to one euro. Would you take part in such an auction?

For example, if the auction ends at three euros, then the winner would get seven euros from the auctioneer and the second-highest bidder would have to pay his bid to the auctioneer (e.g., two euros). The auctioneer would have a loss of five euros in this case. Normally, however, the auction ends with a fat profit for the auctioneer. As soon as two bidders have been found, neither wants to be the second-highest and they repeatedly outbid one another. They outbid one another until they are far higher than ten euros. The only way to end the dreadful state for both is to agree on a common limitation of damages and to get out of the game with the same loss respectively. If the last bidder outbids the current bid by ten euros, the other should not place a higher bid.

At first glance, that reminds us of an *American auction*, customary at charity events, where everyone pays their bids even if they are outbid. It is obvious that the American auction is not an auction form interesting for auction theory. But the ten-euro auction has a relevant corresponding form in business practice.

When a customer is dependent on the ability of his supplier to deliver, for example for safety-relevant or critical quality components in the automobile industry, he likes to choose a *dual-source strategy*. The complete order is not awarded to one supplier, but instead two have to split the order. As a result, the prices are usually worse, because individual suppliers only get a smaller order, but added security makes it worth it for the customer.

Of course, the scope of the partial order represents essential information for a supplier which he needs to make calculations. For example, if the order is not divided into two equally large quantities, but instead one gets 70 percent of the complete order, this one can of course calculate much better prices than the other with 30 percent.

Purchasers often get the idea in this situation that they could hold auctions with two winners; the best bidder gets 70 percent and the second best 30 percent. This idea is often even held as an English auction; then both actually have the same price in the end. Do you see

parallels to the ten-euro auction? The point is reached there at which neither of the bidders wants to be second. Rational suppliers react to the 70 percent/30 percent auction in the same way as you probably had in deciding not to participate in the ten-euro auction. If in doubt, he would probably use his calculation for the 30 percent and not bid more, because he could wind up with the smaller order. If he bid for the 70 percent, he would expose himself very much. For this reason, the effect is called the *exposure problem*.

When the department store chain held three parallel auctions in the price negotiations for digital cameras[9], this was done primarily for the reason that individual pricing is required for different packages in the calculations of suppliers and consequently in the pricing mechanism of the negotiation. The department store chain at least considered the exposure problem correction in its auction design.[10]

Auction design with "I cut – you choose"

Another possibility of dealing with the exposure problem is to do without dividing shares differently and to give the same share of business to every winner. A mechanical engineering company selected this method, because it wanted to continue to work with two development partners for complex electronic components. It negotiated seven development projects simultaneously which were to be conducted soon thereafter in one single Hong Kong auction that identified two winners.

All seven components were specified sufficiently well, so that a fixed price could be negotiated. The price which was arrived at in the ticker of the Hong Kong auction was to be understood as half of the sum total of all seven fixed prices. All bidders knew in advance that the "I cut – you choose" method would be used at the end between the winners. The winner, who left the Hong Kong ticker last, was to make two equal packages in his viewpoint from the seven projects. He was also able to define a compensation payment between the packages[11] if he considered that necessary. The other bidder was then able to select one of the two packages.

The exposure problem was reduced to a minimum for the bidders using this method. The special feature of this contract award was that the mechanical engineering company did not know very well how the respective projects would be valuated among the bidders. This assessment was especially left to the bidders in the "I cut – you choose" principle.

7.4 Entry barriers for bidders

Are you pleased when you get an invitation to an auction?

Let's assume that you find an antique globe in an auction house as you have long been looking for. You would like to take it home immediately. You are willing to negotiate a price to this end.

Instead, you are told that the globe will be auctioned in a few days. You fear perhaps correctly that other interested people might obtain information about it in the meantime and expect that the auction will take place in a price war. Instead of looking forward to the auction, you spend days of uncertainty and do not know whether you will be able to be happy with the globe or its price after the auction.

A supplier experiences the same thing, who has been negotiating with his customer for weeks about a new project order. Instead of finally getting to price negotiations, he is told one day that there will be a purchasing auction for this order the next week. The invitation to the auction is effectively an ultimatum game for the supplier. He either takes part in the auction or he loses the order for sure. But if he takes part, then he has to deal with all consequences of the competition. This is normally not good news for him.

In fact, bidders often hesitate to take part in auctions. There are essentially two reasons for this: one rational and one emotional. The rational reason applies if a realistic assessment of competitors by the bidder results in the conclusion that he does not have a chance to win the auction in any case. Why should he then stroke the flames of competition in addition? If a bidder has a fighting spirit and does not allow any margin to competitors either, then he will of course always take part in auctions. Other bidders behave in a more reserved manner. They realize that they only make prices worse in the market, in which they are still doing business themselves. Such bidders consider it more reasonable not to take part in an auction as soon as they realize that they do not have a chance.

But many decide only not to participate as a single bidder and link up with another bidder, who thinks in the same way. We observed this behavior in the two real estate pros in the foreclosure sale.[12] In a bidding partnership, they were able to expect a much higher profit from further sale of the property than if they had pushed the price upward mutually. Of course, this behavior was extremely undesirable for the auctioneer, because he lost a piece of the pie that the competition between the two real estate agents could have produced for him.

The emotional reason has something to do with the basic acceptance of the negotiation form of an auction, especially if it takes place online. Consequently, vehement aversion to auctions can be observed among suppliers, who are invited to purchasing auctions by their customers.

Such bidders consider it inappropriate to negotiate a large project order via an online auction. The auction makes the bidding process anonymous and puts the human factor of the relationship between seller and buyer in the background.

The other side of the coin: an auction needs every bidder

However, that is a problem for an auctioneer, because every auction needs bidders to be successful. An auction with only two or three bidders can also be successful in exceptional cases. This entails a great deal of luck, or the auctioneer knew in advance that he invited precisely the right bidders, who wanted absolutely to win. In any case, however, an additional bidder is not a disadvantage, but instead increases the chances for a successful auction.

As an exception that confirms this rule, I would like to tell you about a strange special case, in which a bidder actually hoped that a second bidder would take part. It was a question of a public call for bids for IT services for a government research institute. The existing contractor had a multiple-year contract which was then to be extended. Public procurement law prescribed a call for bids, in which other bidders should also get the chance to win the contract. But the special requirements of the research institute were so extraordinary that the existing partner was certain that no other bidder could come close to his price. The managing director even said to me that "I hope that a second bidder submits a bid. Then our customer will finally see how much we are already below the market price with our prices today." Consequently, that actually was a call for bids, in which a second bidder would have been counterproductive for the one awarding the contract.

The auction design influences the entry barriers of bidders

The auction design influences to a certain extent whether bidders tend not to take part in an auction or whether they might even find the process attractive. If there is any doubt about this, both the rational and emotional reasons of bidders to hesitate in part speak in favor of sealed auctions. Submitting a bid in a sealed auction does not "cost" much and entails a certain chance of winning, even if you do not expect to.

In a few European 3G cellular phone network license auctions, the same behavior as that of the two real estate pros was feared from weaker bidders, that is, to prefer to join together rather than to compete against each other. That was the more fundamental reason why the already discussed Anglo-Dutch auction was proposed. According to Paul Klemperer, it presents above all the advantage of providing weaker bidders with an incentive to participate. They can expect to have a better chance of surviving the first round, but only if there is an English auction. The second, sealed round also has a more attractive character for weaker bidders.[13]

In the context of awarding industrial contracts, important suppliers often vehemently state emotional reasons against participating in an auction. In these cases, the *English light auction* has proved successful, a hybrid auction design which the bidders perceive as a sealed auction in two rounds. The final price negotiations among the last bidders are held on two dates which optimally take place a few days apart. On the first of the two days, the number of bidders is reduced with a first-price-sealed-bid auction, for example, from seven to five. Each of the bidders submits a binding bid. The best price bid on the first day is considered the *reservation price* for the second round, that is, if it is not improved on the second day, the best bidder of the first day is the winner.

All bidders see the submitted bids of the competitors (without information about who bid what) at the end of the first day. The days between the first and second round provide the bidders a chance to process this information. A sealed auction is again held on the second day among the remaining bidders. The winner of the auction is identified this time. The auctioneer has the choice between two variants of the auction design; he can hold the second round as a second-price-sealed-bid auction (consequently the name "English light") or as a first-price-sealed-bid auction. The considerations about which variant to use employ the arguments addressed in section 7.1.

Not only the number of bidders is decisive, but also their quality

A German department store chain sold 74 of its stores in 2005. The efforts to sell them were a topic in the daily press for months.

More than 100 interested parties expressed potential interest to the project manager, who was in charge of recapitalizing the department stores. Why wasn't a sale auction held at that time?

The interested parties mentioned involved a rather extensive range from a few competitors to numerous private equity companies from Germany, England and France, individuals and intermediaries from

Japan, Korea, Saudi Arabia, Israel and the USA, and even included calls placed from Spanish telephone booths. After a detailed check, it was found that only a half dozen of 120 interested parties had a "genuine" interest in buying. The others only wanted to obtain information, so that they did not miss out on a bargain. Nobody wanted to admit very strong interest in buying. This also confirmed the predictions of renowned investment banks which applied to take on the challenge of finding interested buyers.

The project manager responsible for recapitalization thought over the option of preparing an auction.

However, he very quickly decided not to use this option. If he had even mentioned the word "auction", then the few interested parties on whom he had to rely would have lost interest immediately. To the contrary, the bidders had the power in this case to demand exclusiveness as long as they made their assessments (known as "*due diligence checks*" in actual practice). Consequently, a sequential negotiation process was required, in which negotiations were held respectively with only one interested party. The trick in this was not to become dependent on this one negotiation partner despite exclusiveness. According to the project manager, the most important success factor for this sale, which was transacted to the great satisfaction of the department store chain, was to give a credible impression till the end that they were not dependent on any one single negotiation partner.

7.5 The reservation price and other focal points

Time and time again, auctions are arranged without pressure of competition. Such an auction can have a lucrative result for the one bidder or a few bidders. But this game is very risky for auctioneers.

If the auction ends at a level unfavorable for the auctioneer, then he has to accept this price. Consequently, many people believe that it is better in such a situation of weak competition to eliminate the binding nature of an auction. Then the auctioneer would still have the option of voiding the result. The already weak competition argument has the wind taken completely out of its sails in such an auction. This can still be a flop even though competition was involved.

Consequently, there is no case in which the binding nature of an auction should ever be renounced. In situations with little competition, it is often better to renounce holding auctions altogether and instead to conduct conventional negotiations, as we saw in the case of the 74 department stores[14].

But it is essential for an auctioneer in every auction that he defines a *reservation price*. This means that an auction is only binding if the reservation price is reached. An auctioneer could only ensure in this way that he does not get a price worse than his own indifference price in a worst case scenario. An important question for the auctioneer is how exactly do I go about setting my reservation price?

The rational reservation price according to an economic viewpoint is the indifference price of the auctioneer.[15] In turn, it is easiest for an auctioneer to determine his own indifference price if he has secured at least one alternative as an option before the auction. Consequently, it is recommended to obtain binding offers from bidders in preliminary negotiations. These need not represent great negotiation success, but they also protect the auctioneer against a risky auction result.

Another variant of the reservation price or indifference price from an auctioneer's viewpoint is the limit beyond which he actually does not conclude any transaction. This can happen in a purchasing auction, for example, by including a *make-or-buy* decision in a reservation price: This stands for the internal costs for producing a component ("make"). If the best supplier offers a price lower than this reservation price, then this supplier is given the order ("buy"). If no supplier offers less than the reservation price, then "make" is obviously the better solution for this component.

The reservation price is often confused with the *target price*. That refers to the price which the auctioneer sets as negotiation target. Using this as reservation price means that the auctioneer does not want to grant any binding property if he does not reach his target. This method only makes sense if an alternative negotiation or decision-making process has already been defined if the target price is not reached. Otherwise, auctions become similar to events which are non-binding in nature.

Reservation price as focal point

Should an auctioneer tell bidders before an auction starts that there is a reservation price and how high this reservation price is? In the sense of the binding nature, the auctioneer must point out the existence of a reservation price in any case.

An auction in which a reservation price exists which the bidders are not aware of contradicts the binding nature. But this does not mean that the bidders need to know this reservation price before the auction starts. If they know it, then the reservation price is a *focal point* for the bidders.

Focal points are also known from bilateral negotiations. When you buy or sell land, then the square meter price of the land in the

neighborhood, which was recently sold, is an important indicator for you, regardless of whether you are buyer or seller. You need really good reasons to get a very different price. In industrial purchasing, a common negotiation tactic is to present a *benchmark study* to your counterpart.[16] That is nothing other than setting a focal point in negotiations.

A reservation price announced before an auction is such a focal point.

If the reservation price differs substantially from the target price of the auctioneer (this is usually the case), then this focal point is counterproductive for an auctioneer. Consequently, he should keep it secret and deal with it in the same way as if it were a question of an additional bidder.

In fact, a sealed reservation price acts like an additional bidder in an auction. In a sealed auction, for example, it must be disclosed together with the bids of the competitors. A Dutch auction ends suddenly when it is reached (as if another bidder had confirmed). In an English auction, it is disclosed when it is reached and consequently the binding nature of the auction takes force. That is as if the competitors discover that this special bidder has dropped out. In a dynamic English auction, that differentiates him a bit from the other bidders, because their "dropping out" is not really announced. In an English ticker auction, in which the number of bidders is decreased, the dropping out of a bidder and disclosure of the reservation price has exactly the same effect.

An important focal point: the start of a Dutch auction

I still haven't told you the result of the Dutch auction for building the cafeteria.[17] The start of the Dutch ticker was set at a price of 7.9 million euros for the project. The building contractor had calculated an indifference price of eight million euros.

But because he was already told the start price of the Dutch auction one day in advance, he had a whole day to think about his indifference price. Similar to in an English ticker auction, he was able to recalculate here.

He was ready to forego a strategic margin anyway, because his situation was already precarious following his negative experiences of the previous weeks and months. But he was also aware that he could not simply bid below his indifference price. The only thing worse than not getting an order is to get the order with which you are sure to make a loss. In spite of this, he wanted to confirm the start price to be sure that nobody else took the order away from under his nose, so to speak. As a result, he rechecked his cost calculations and identified 100,000 euros

of costs that he could eliminate and thus save. With the certainty that he could also carry out the project for 7.9 million euros, he confirmed the start price the next morning and won the auction with it.

In actual practice, a disproportionately high number of Dutch auctions are confirmed at their start price. In individual cases, the reason can also be that the start price was not selected sufficiently aggressively. In its systematics, however, it instead indicates that the start price of a Dutch auction exercises a great deal of attraction for bidders. Especially if the start price is announced in advance, the auctioneer can even influence the indifference price of bidders successfully.

7.6 Summary

Deciding between first-and second-price auctions and hybrid auction forms

The factors in deciding between first-price and second-price auctions depends on how urgently the bidders need the order, how different the price levels of the bidders are, and whether the auction object has a common value character. In most competition situations, one basic auction form is not optimum, but instead a combination of several auction or negotiation rounds. One hybrid auction form used in many competition situations is the Klemperer auction, in which the two winners of an English auction then participate in a Dutch auction. A further development is the Hong Kong–Dutch auction, which – although it does not avoid winner's curse – eliminates the possibly counterproductive signal of the third best bidder.

The exposure problem

With many different auction items, bidders need to have the certainty to which item their price is applied. If they do not have this certainly, the auction result is worse.

Entry barriers for bidders

The number of really interested bidders is decisive for the success of every auction.

Sealed auctions are considered more attractive for bidders than open auctions. The English light auction is also accepted by bidders, who would avoid an English auction.

Reservation prices and focal points

A sealed reservation price acts like an additional bidder representing the indifference price of the auctioneer. At the same time, an open reservation price is a counterproductive focal point for an auctioneer. On the other hand, the start price in a Dutch auction can be used as an attractive focal point.

8
Disruptive Factors in Auctions

8.1 Strategic demand reduction

A company got the idea of purchasing janitorial services for all of its 22 locations across Germany by calling for bids. Until then each location had normally signed contracts with local providers of janitorial services. But there are a few large service providers who promise very professional service throughout Germany. The idea was to negotiate a much better price for janitorial services at all locations by calling for bids for a one-year contract. The order was worth several million euros.

But there were two considerations militating against this idea. The first concerned the internal preferences of the location managers. Experience had taught them that the quality of janitorial services depended significantly on the personnel employed. Each manager had personally experienced the work of various service providers, including the big ones. From their perspective, the provider could only be selected based on this experience.

The second was a business management consideration. The *effect of economies of scale* in calculations normally favors *bundling*[1] orders. The bigger the volume of the order, the less the importance of *fixed costs* such as administration costs, rent, depreciation of machines, and so on. The price per unit can be calculated that much lower the more units an order covers. But this theoretically generally valid effect has a very different effect in various calculations. In production orders, it often is the deciding factor concerning the profit or loss of a project. But it only has a very slight, negligible effect for services such as janitorial services. The reason is that the calculation of services is dominated by *variable costs*, which depend on the order size (wages, cleaning agents, etc.). In this business, it is even possible to get a better price for a small job than for a big one.

Game theory unmasks the strategy

Against this background, the idea of a nation-wide call for bids in Germany had almost been discarded when the company began to consider the matter in terms of game theory. The company noticed that two of the big, national providers had previously had contracts at many locations. But a pattern appeared over the past years; one of the two providers only bid competitively at locations in the southwest, and the other only in the north. When the central purchasing agent in the company learned of this pattern, he recognized that this behavior reflected a game theory strategy.

Does that remind you of the two real estate pros in the foreclosure sale?[2]

They both preferred splitting the item and consequently avoiding competition with each other. This behavior is called *strategic demand reduction*. The variant of the real estate pros, who joined to form one block of two bidders, is only one special form available in situations involving one single item.

In the case of janitorial service contracts, one of the national providers consciously offered its services solely in the southwest, and the other consciously only in the north, to avoid competition. When several objects are involved, as the contracts at the individual locations here, this strategy can even be pursued without an explicit pooling agreement among bidders. Then it is a question of coordination between competitors, as we have already discussed in connection with repeated games[3]. Consequently in a certain sense, the games can be repeated parallel, for example, in another region instead of at a different time.

The principle of strategic demand reduction can thus be "mirrored" from the demand in a sale situation to the offer in a purchasing auction. Bidders do not want to buy there, but instead sell their services. The term "strategic demand reduction" is also used in competition between suppliers here meaning the "demand of the supplier for project contracts". Another form to use this is to "say 'no' for a good reason" to orders now and then.

A dynamic combinatorial auction as anti-collusion method

I suggested a method to the company for awarding the janitorial services contract that corresponds to the dynamic combinatorial auction. To comply with the preferences of individual locations for local providers and get rid of the strategic demand reduction of the big providers, different bid combinations had to be permitted. In doing this, we limited the permissible bid combinations substantially for each bidder.

The large companies were only permitted to bid nationally. Other, mid-sized companies were only permitted to bid at locations in their region. Many small providers were only allowed to bid for one single location.

The auction process was designed with respectively two-hour rounds and open end. In the first hour, the bidders could submit their bids per e-mail or fax. In the second hour, we determined the respectively optimum allocation. Thanks to the limited bid combinations, the calculation work was easy to master. In addition, we reserved the right to intervene manually in the allocation based on additional criteria (e.g., the preferences of individual locations). Each individual bidder was told at the end of the second hour whether his bid was considered or not. Then he could decide whether he wanted to improve his bid in the next round. If no bidder improved his bid, the final allocation was found and the participating bidders got the contracts in question.

The auction ran for three days and displayed remarkable dynamics. In a slow moving initial phase, our assumptions were confirmed that the two big providers wanted to divide up the regions among themselves. Only individual, small providers changed their bids from round to round. In this phase, the central purchasing agent intervened manually in the determination of the "best allocation".

Although the calculated result would have awarded each of the two big providers one region, he punished one of the two in a round for its passive bidding behavior and disqualified it from the allocation. The intervention entailed the risk for the purchaser that he would have to keep this allocation if he did not receive any bids thereafter. But in fact he stirred up the flames of competition very suddenly among the big providers. The small providers also reduced their prices substantially with this competition. At the end of the auction, it was possible to select an allocation that provided a substantially improved price level and also did justice to the preferences of the individual locations. The key to success was clearly in eliminating the strategic demand reduction of the big providers.

Closedown of a production site as a tactical measure

The steel market is known as an industry where you should not count on much competition between market participants. Steel producers have known each other for decades, they know each other's prices and each other's volumes. The big crisis of 2009 also caused turbulences in this market, but nowadays it is moving back to its old stability. The buyer of a steel processing company got to feel very drastically which unwritten rules underlie this market. In a "historical situation of overcapacities", as

he evaluated the situation, he intended to execute an auction between steel companies in order to place his yearly demand. The proceeding was new to all players and was communicated in exhaustive bilateral meetings to every steel company in advance. There was no big enthusiasm among the designated bidders. In particular, they did not signal any willingness to enhance their own sales volume with this client. They rather declared the story of overcapacities to be a big misunderstanding. No competitor saw any reason to crowd out any other competitor with this client. A press release by the biggest steel company invited brought the final clarity about the fact that the auction was really a bad idea. Just one day before their communication meeting, the steel company announced the closedown of a production site with about the same capacity as the yearly demand that was supposed to be placed in the auction. The buyer had to admit that his evaluation of overcapacity was right, but his estimation of the behavior of the market participants was completely wrong. He had to cancel the auction and had a really hard time negotiating new prices with the steel companies.

8.2 Signaling games among bidders

Strategic demand reduction is a strategy that only works if the competitors coordinate. This can be the case in a repeated game or in negotiations for several objects, which the competitors divide. The fine art on the bidder side is to arrange this coordination. An explicit agreement among bidders is illegal in most cases. Consequently, other legal means must be employed to reach an agreement with competitors. The steel company dealt with in the previous section consciously selected the medium of a press release in order to announce the closedown of a production site. So they could be certain that the competitors also understood that it was not time for destructive competition.

A famous story of an American cellular phone network license auction in 1994 is a good example of signaling games. There were calls for bids for cellular phone network licenses in various regions, which could be bid for parallel in a simultaneous ascending auction. The bidders were phone companies, which had already become established in the various regions and were then trying to get into the still new, additional field of business of cellular phone networks. During the auction, there were in part conspicuously non-rounded amounts bids. For example, instead of bidding $ 9,750,000, bids such as $ 9,751,374 were submitted. At the same time, it could be seen that there was no real competition between bidders. What happened?

It was discovered afterward that the last places of the non-rounded bids always corresponded to the zip code of the bidding company.[4] In this way, the bidders signaled their own identity as the one submitting the bid.

The "tit-for-tat" strategy was played out perfectly between the competitors using this communication medium. Each only bid his best bid in his region and let the others bid in their regions in peace.

Signaling games in the German cellular phone network license auctions

Signals between bidders could also be seen in the German cellular phone network license auctions, both in the GSM auction in 1999 and in the UMTS auction in the following year.

In the GSM auction, only two serious bidders ("D1" and "D2") and two other smaller bidders competed for ten frequency blocks. The design of auction dynamics of the simultaneous ascending auction employed stipulated that bids could only be submitted for each frequency block, which were ten percent higher than the current bid for the respective block.

The auction was to continue until no new bids were received. But one of the big bidders already submitted a bid as an initial bid for all ten blocks at once, which the small bidders could not outbid. He bid 40 million German marks for each of five blocks and 36.36 million German marks for each of the other five. Do you see the signal that he sent with that?

Supposedly, a representative of the other big company said afterward: "Given game theory, the signal was easy to interpret." It outbid the 36.36 million German marks by ten percent each time and also arrived at 40 million German marks for each of the five blocks. The signal meant the following to him: "Let's each be satisfied with five blocks. I am offering you that we both pay the same price for them."

The matter was somewhat more dramatic in the UMTS auction only one year later. In addition to the two big German telecommunication companies, another five newcomers joined in the bidding, mostly sponsored by foreign companies. Twelve frequency blocks were sold, once again in a simultaneous ascending auction.

The design of auction dynamics also essentially stipulated this time that each bidder could only bid simultaneously for two or at the most three blocks.

From the original seven bidders, six were left after a relatively short time. Strategic demand reduction would have resulted in the end of the

auction immediately among the remaining bidders if all bidders had been satisfied with only two frequency blocks. The four newcomers also soon bid for only two blocks each. But the two established companies still hoped to be able to squeeze out at least one of the newcomers by continuing to bid on three blocks.

At a level corresponding to approximately 50 billion German marks for all 12 blocks, a few bidders began to bid conspicuous amounts. For example, they bid 6,666 billion German marks or 6,060 billion German marks for individual blocks. We can assume that these signals were supposed to mean "Let's split it among us six." The two big bidders ignored these signals and pushed competition up to a total volume of approximately 100 billion German marks. But they gave up in the end, and there were six winners who each got two license blocks. This is the reason why Paul Klemperer said about that:[5] "...good luck, not good design."

Another advantage of English ticker auctions

The FCC likes to hold *clock auctions* for American cellular phone network licenses, mainly to prevent these signaling games. This is a ticker variant of the simultaneous ascending auction, that is, a "multi-object English ticker auction", whereby a ticker is foreseen for each object. These tickers run parallel, and bidders can only confirm them or not. In addition to the big advantages of the English ticker auction,[6] which was already summarized in section 6.3, it also prevents signaling games.

But a clock auction is not possible as a combinatorial auction (too many parallel tickers would be required), so that it usually serves as the preliminary round in a combinatorial sealed auction. In a certain sense, this method is a variant of the Anglo-Dutch auction.

Signaling games in conventional auctions for antiques

The phenomenon of signaling games is not at all limited to auctions for cellular phone network licenses. A professional dealer, who takes part in auctions for antiques at respectable auction houses at regular intervals, told me a very impressive story.

According to him, the first row of chairs is always reserved for the pros. When a pro is interested in an object, then he bids in a way that the interested individuals in the last row cannot see it. This ensures that the interest of the pro does not drive up the valuation among interested individuals. There is a mutual, unwritten law among pros that you do not outbid each other. Consequently, it is important that the pros can see whether a bid comes from the first row. This is a question

of conventional strategic demand reduction among this subgroup of bidders.

The auctioneer tolerates this game, because he can rely on another unwritten law: If one of the interested individuals bids for the item, then the pros bid along forcefully. This ensures that an attractive price is reached for the auctioneer whenever an interested private individual takes part in an auction.

8.3 The best way to deal with cartels

How should a phenomenon be dealt with, which is actually prohibited but practiced anyway time and time again? Making agreements with competitors to coordinate joint strategic demand reductions is forbidden and subject to high penalties. We have seen, however, strategic demand reduction works in situations of repeated games even without previous agreements and is a successful strategy. Coordination among competitors can be handled via signaling games or even only by conscious parallel behavior. Consequently, the discussion will turn from the legal aspects of cartels and agreements to the economic aspects of the topic.

We already discussed the incentives in section 4.2, which work for or against collusive behavior. The result produced the five most important factors, which work against formation of cartels: higher defection profit, less collusion profit, rare repetitions, slight transparency of competitor prices and the greatest number possible of market participants.

A purchaser, who expects collusive behavior from his suppliers, must consider these five factors. Essentially, he has to ensure that a negotiation has a one-shot character and the greatest possible number of competitors is involved. How should he negotiate then after he has created these prerequisites?

Cartels can undermine auctions

One of the five factors of influence directly concerns the negotiation form: the question of the transparency of competitor prices. The better the bidders' ability to watch each other, the better the coordination between them. As long as one single bidder sees with certainty that the others act in collusion, he can also act accordingly. On the other hand, if he observes the deviation of one individual from collusive behavior, he can react immediately with "tit for tat". Most dynamic English auctions fulfill these prerequisites and consequently are extremely risky for auctioneers when there are collusive tendencies among bidders.

If there are not only "collusive tendencies" among the bidders, then you have to expect that there are out-and-out agreements. In these cases, I strongly advise against any form of simultaneous negotiation, especially auctions. It is too easy for a cartel to boycott the event completely.

Different effects of auction forms on cartels are discussed in auction theory. For example, a second-price-sealed-bid auction provides a cartel with the chance to protect itself against the defect of candidates from its own camp with an agreed-upon bidding scheme.

They can agree, for example, that the one who should win this time with an attractive price bids an extremely unattractive price. All others bid an (for bidders) attractive price. As a result, he wins the auction and gets the attractive price according to the second-price logic.

To break out of the cartel would mean to want to secure the business this time contrary to the agreement, although it is not your turn.

To that end, you would have to bid an even more unattractive price, that is, aggressive price, than the selected bidder and would get his bid as price, although that was already selected as an unattractive price. Consequently, auction theoreticians consider second-price auctions more susceptible to cartels in cases of doubt compared to first-price auctions. In actual practice, however, it is rather the factors of influence of the big game mentioned above that have decisive influence on cartels.

When it gets really bad, negotiate sequentially!

There was an especially exciting case in connection with collusive behavior in the electronics industry. An electronics company wanted to hold an auction with its suppliers from Asia for the first time. We were rather proud of the very complex auction design, in which all imaginable aspects of the special competition situation were considered. The complete negotiation process was to take five rounds, including four as online auctions with different possible intermediate results, which all had their solidly defined influence on the further course of the negotiation process. The process had a few really beautiful details for auction theoreticians, which I will spare you here.

When we explained the negotiation process to the suppliers, we were only met with incomprehension. They explained unanimously to us that they did not know what we wanted from them. The cultural breach from the previous negotiation practice was enormous in relation to the suppliers. Already based on emotional reasons alone, they were not able to understand this complex process even the slightest bit.

The days before the start of the planned process were rather hectic. It became clear that no single supplier would take part in the auction.

In this phase, we received an e-mail as part of a distribution list, which we were not supposed to be on. One supplier had requested that his competitors explicitly behave like a cartel and boycott the auction.

Thus the sender of the e-mail was the initiator of the cartel. We only received this information thanks to a mishap and the carelessness of the sender. We unfortunately were not able to take legal steps against the supplier.

In addition to the enormous amount of work and the associated uncertainties, there was the aspect that we were dependent on all of the companies in the long term, because they were among the few existing suppliers worldwide of the components we needed. Consequently, we did not want to risk a dispute before the courts. We were forced to play a different game.

The standard operating procedure against a cartel is to deal with the cartel participants sequentially. You meet with only one bidder bilaterally and give him a TIOLI. It has to be totally clear that it is a question of a real ultimatum. Consequently, he is forced to break out of the cartel, or there will never again be negotiations with him about this business. If he rejects it, you meet with the next supplier. If the suppliers prove to be stubborn, you unfortunately have to give in and give a TIOLI[7] to each one until the last one. This procedure also only works if you did your homework well about the "one-shot character".

In the case of the cartel described, we were able to select a different operating procedure. After we knew who the initiator was, we gave him the complete business at an attractive price without further negotiations. That was a certain investment of the electronics company, but which paid off. We made certain that the other suppliers learned that there would be no further negotiations for this transaction. The one who got the order became known on its own in the market. The other suppliers were offended that the one who got the big pie was the one who had appealed for the others to boycott. This cartel was damaged considerably for quite a few years.

Rule of thumb "keeping the status quo" ought to be stopped

A market known as extremely collusive is the market of inks and lacquers. An oligopoly of few suppliers serves the industry with products that are very critical for the quality of most final products. With this in mind, it was the reflex strategy of a buyer of automotive lacquers to keep each of these suppliers well-disposed and to place a certain volume which had been established over the years at each of them. But the yearly price negotiations became increasingly demanding. Suppliers started to react

to requests for quotes only with price appreciations and requests for additional volumes were partially even not responded to at all.

In this situation, caution was necessary. The assumed security of a "multiple-supplier-strategy" had in fact caused a complete negation of competition among the suppliers. Each of them knew over the years that he could be certain about this client's volume and that it was not necessary to think about prices in order to keep it. The situation had even been the other way round: Becoming the supplier of bigger volumes was not appealing to suppliers because it was clear to all market participants that this would ignite competition and be the end of a comfortable time of collusion.

As already described above, it isn't a good idea to consider an auction in such a situation. Basically, sequential negotiations like *TIOLI chains* should be preferred. In the case of the customer of the automotive supplier, he had to start redefining his negotiation objects, that is the bundles of business each supplier could win, in order to come back to fruitful price negotiations at all. The essential trick was to realize that he had to dispense with at least one supplier completely in the next contract period. Only this immediate threat of actually being replaced was enough incentive to offer bigger volumes again. The message to the suppliers was: "The status quo is over. You will either deliver more than today or nothing at all." This language was clear enough – especially concerning a market that was unusually demanding for lacquer suppliers as well – so that it was finally possible to hold an even auction-like final decision round at the end of the yearly price negotiations.

8.4 Summary

The strategic demand reduction is a refined form to secure business success in a market, as long as it is done within legal limits. From the viewpoint of bidders in an auction, it is the best means against the competition argument. It can become established among competitors alone by conscious parallel behavior or promoted via signaling games. Explicit agreements are forbidden under antitrust laws. If you are dealing with a real cartel on the other side, you should not hold an auction, but instead deal sequentially with the cartel participants. An essential lever against collusive behavior is to break off the status quo of established supply volumes and to bring movement to the allocation of business between suppliers.

Part IV
Prerequisites for Real Auctions

9
The Comparability of Alternatives using the Bonus System

9.1 Bonus and malus as correction factors

There is theoretically precisely only one difference between sales and purchasing auctions.[1] In a sales auction, all bidders bid for one and the same item. In a purchasing auction, however, the bidders only bid respectively for the same item. This means that the bidder items in a purchasing auction can differ more or less. It does not matter at all whether it is a question of simple merchandise, complex component supplier parts, a project order or a service, for example. Each bidder can fulfill the needs of the customer only with his individual item or individual service. The goods and/or services of the different bidders rarely correspond to the extent that a decision can be made based solely on the price.[2] Consequently, the customer has to compare the bidders. The perfect method for doing this is the *bonus system*.

The bonus adjusts the competition argument

A bonus system involves valuation of the individual services of the bidders by the customer. If the goods and/or services of all bidders are of equal value, then nobody gets a bonus. But if the goods and/or services of a first bidder are valuated higher than those of the second one, then the first one gets a bonus. The customer measures this bonus in such a way that he is indifferent as to whether he purchases the auction item of the first bidder with a price higher by precisely the bonus or the other item of the second bidder.

Consequently, the bonus adjusts the competition argument between the two bidders.

If both suppliers offer different goods and/or services, it is not correct in either a bidding event similar to an auction or in conventional

negotiations to compare the price of the first supplier (the one which promises to provide better goods and/or services) with the price of the second supplier directly. Unfortunately, the practice of demanding the price of the second supplier from the first one is very widespread. But this ends in negotiations with distorted competition arguments and without commitment.

The comparison price is negotiated

The application of the bonus system in negotiations requires the term *comparison price*. That is the price, which is discussed with all suppliers. Let's assume that the second supplier (the one with the poorer goods and/or services) is selected as "neutral reference basis". As a result, his comparison price equals his bid price. The comparison price of the first supplier, however, is his bid price minus his bonus (see Figure 9.1). Compared to the competitor, his bonus makes him "stronger".

The supplier can then determine from the comparison price cited in negotiations what this means for him. It is important that each supplier knows the sum total of his bonuses. If a supplier is worse than the neutral comparison price, then he gets a *malus*, that is, a "negative bonus". The supplier simply adds his total bonus to his comparison price (or subtracts his malus) and gets his individual price, which is being discussed in the negotiations (see Figure 9.1). That supplier with the best comparison price wins the negotiations, even if his actual offer (his individual price) is possibly higher than that of a competitor.

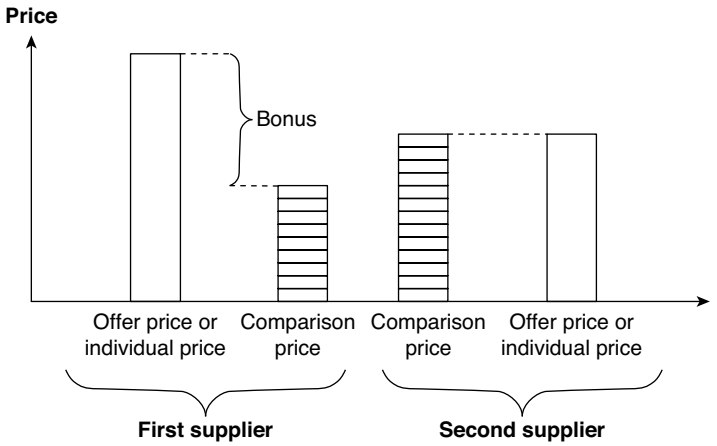

Figure 9.1 The comparison price in negotiations

It does not matter here which negotiation or auction form is involved. Genuine, that is, binding auctions, only become possible through application of the bonus concept. But also in conventional negotiations, which arise from bilateral negotiations with several negotiation partners, the competition argument can be applied much more credibly and strongly with use of a bonus system. I have seen in many projects that simply the introduction of a bonus system and talking about comparison prices have generated considerable competitive pressure. It is often even advisable to separate the first step from the second one on the way to holding binding auctions and at first only to introduce the bonus system. Only after suppliers have gotten used to that should you go over to binding auctions in a second step. Introducing both at the same time oversteps the mark now and then.

An imprecise bonus system is at least as good as none at all

Most purchasers, who consciously state that they are against using a bonus system in awarding contacts, doubt that they can valuate the individual suppliers and their goods and/or services. No matter how much work you put into analyzing the offers, you could never determine an exact valuation. This argument cannot be dismissed outright at first glance. Determining an exact value for a bonus really involves an arbitrary degree of difficulty. But the conclusion that you *could* not use any bonus system as a result is false.

When decisions are made without a bonus system, then the following simply happens: To decide between suppliers, you compare the offer prices and consider the price spread between them. This price spread created explicitly by the submitted offers is then compared with the differences of goods and/or services of the suppliers. Consequently, individual goods and/or services must also be assessed here. For an expensive supplier, the fact is decisive of whether better goods and/or services justify his price spread or not.

The only difference between these considerations and the determination of a bonus for suppliers is that the price margin range is shown explicitly. At determination of the bonus before the final round of negotiations, the price spread does not exist explicitly yet. The question is posed differently there; how big can the price spread be in order for his goods and/or services to be sufficiently better that we select him? A bonus system, which only wants to provide at least such a good decision-making process as the conventional decision-making process, can be determined pragmatically and with little work. The only new feature is to pose the question about the price spread the other way around in deciding about suppliers.

Odd trick of the "double bonus"

A few purchasers still do not believe in the effect of clearly communicated negotiation rules.

They hope to get an advantage from nebulous decision-making structures and negotiation processes. The worst thing about this is that they often get their way if the sales force of the supplier is sufficiently gullible. I experienced an especially remarkable attempt as consultant on the sales side of a bidder. My client was invited to an online *bidding event* for a relatively important order. Although the event was staged as an auction, there was no commitment by the customer. Consequently, it was only a "bidding event". Parallel to this, framework contract negotiations for this type of business had come to a standstill. The customer wanted to strike out a logistics clause, a clause which represented a significant advantage for my client. In the context of the bidding event, neither of the two sides addressed this topic until the end. My client saw no reason to act, and the customer hoped to get an advantage for the negotiations from the unsettled situation.

We did not want to act as a price-cutter in the bidding event.

If a bonus system had been used, our price would have been subject to a "malus" due to the logistics clause, that is, it would have had to be displayed higher compared to competitors. The comparison price would have been higher than our bid price. But there was no talk of a bonus system. Consequently, we submitted our bid price on the auction platform. The ranking, which we were shown, was "1st place". Nothing happened during the complete bidding event from our viewpoint; we did not change our offer and remained in "1st place" until the end.

After the end of the bidding event, the purchaser of the customer contacted us and explained the following: The course of bids was rather dramatic. One of the competitors had moved close to our price by and by. Starting from a price, which was more than 20 percent above our price, he stopped shortly above our price.

But because the purchaser had assigned us a "malus" of eight percent due to the special framework contract clause, he would have to select the other bidder. The only chance to prevent this would be for us to decrease our price by eight percent.

If the bonus system had been used correctly, the bidding event would have stopped at a price of eight percent above our price. Now the purchaser wanted to conclude the agreement at eight percent below our price. The spread between these prices corresponds to a double (negative) bonus. Of course, we did not accept that. But we had to use the whole weight of our long-term supplier relation to conclude the transaction at the price we offered.

9.2 Systematizing internal negotiations

A bonus system has the potential of decisively improving the quality of the internal decision-making of purchasers. The price range between two suppliers cannot be compared lump sum with the total goods and/or services of suppliers, but instead can be differentiated according to individual performance criteria. Depending on the significance of a project, any number of individual criteria can be included in a bonus system for valuating performance. Not to use any bonus system corresponds to the extreme case of only one single criterion: the lump sum valuation of the total goods and/or services. A bonus system is recommended in most projects, which is composed of fewer than 20 performance criteria.

A larger number of criteria increase the amount of work disproportionately. In the valuation of bids within one criterion, you can also work on principle with any number of precise analyses, but often only with simple approximations and assumptions in actual practice.

I recommend using valuation methods such as *total cost of ownership* or – even better – with *total value of ownership* in bonus valuation.[3] The basic idea of the "total cost of ownership" strategy is to add all subsequent costs to the purchase price of a product, which arise due to this product during its lifetime. The "total value of ownership" strategy also includes the utility of a product. Although this can be determined much less accurately than the costs, utility should also be considered for improved decision-making.

In Figure 9.2, the criteria of a simplified bonus system are listed, which correspond to a "total value of ownership" strategy in awarding a contract for a complex component supplier part in the automobile industry. In this example, the criteria come from the areas of purchasing, logistics, quality and development. Each single criterion results in turn in an absolute bonus (in euros) or a relative bonus (in percent of the offer price). In this, each supplier is compared respectively with a neutral, ideal supplier. Whether a criterion results in an absolute or relative bonus is based on the nature of the matter each time. For example, logistics costs are always absolute values, because they do not change with the negotiation product price. Valuation of a currency risk when invoicing is in a foreign currency always produces a relative bonus. The risk changes proportionally to the negotiated product price. The sum total of all absolute individual criteria and the sum total of all relative individual criteria produce two values, which together compose the total bonus of a supplier.

Criterion of	absolute bonus(€)/ Relative bonus(%)	Neutral supplier
Purchasing		
Payment term	%	90 days
Currency	%	euros
Liability clause	%	signed
License fees	%	paid
Logistics		
Incoterm	€	DDP ("Delivery Duty Paid")
Transport risks	%	none
Quality		
Audit costs	€	paid
Malfunction risks	%	none
Development		
Delivery deadlines	%	according to project plan
Development risks	%	none
Product properties	€	according to specifications

Figure 9.2 Criteria of a bonus system using the example of a complex component supplier part

The bonus system is of department-overlapping interest

Today, most companies already deal with valuation strategies similar to total value of ownership. The challenge is less intellectual in nature, but instead involves synchronizing the different interests of the various company areas. The task of determining the total value of ownership is often seen as an academic exercise in this respect. The task is often not fulfilled, because the internal work does not seem justified.

Applying total value of ownership explicitly as a bonus system in awarding a contract means expecting a reliable basis for decision-making from an "academic exercise". This fact alone forces us to be sufficiently pragmatic to reach a result that can be used with a justifiable amount of work. It can be observed time and again that credible total value of ownership is determined for the first time via the roundabout way of a bonus workshop and more or less as a waste product.

The side-effect: more objective documentation

A side-effect of the bonus system is the objective documentation of the decision-making process. Sometimes the preference of a purchaser is influenced by financial gifts (i.e., bribes) from a supplier. This damages the company of the purchaser economically, because obviously the

supplier with the best value for money was not selected (which would have not needed to bribe the purchaser).

A method that can currently be observed in the automobile industry to protect oneself against this is to rotate the responsibilities of purchasers for different materials relatively quickly. This prevents an intensive relationship between purchaser and supplier, but it also eliminates the chance for the purchaser to observe the market for a longer time period and consequently to get to know it well. At the same time, the danger of corruption remains, because individuals can also be bribed without relationships of many years.

A much better protection is provided by the obligation of a decision-making committee to apply a bonus system to each supplier decision. Each member must quantify and give reasons for his preference for a supplier. The decision-making committee influences the supplier decisions solely via the bonus system and the selected auction or negotiation design. Once the negotiation process has been started, this decision is made "mechanically" based on the comparison prices of suppliers.

9.3 Systematizing external negotiations

It is very effective to apply the bonus system to characteristics of a supplier (beyond those of his bid), which he can influence in the short term. A typical example is represented by framework contract clauses, for which no agreement could be reached for months. This can refer to general terms of liability or logistic conditions, which are agreed upon at a superordinate position between suppliers and customers. If such topics have not been resolved with a supplier, then the customer can set in concrete awarding of a contract, for example, that the supplier receives a "malus" if he does not sign the framework contract clause. Even long-term unresolved topics can often be resolved in this way in no time. The individual order in question only need be sufficiently interesting.

The fine art of purchasing strategy starts when you link various price negotiations and contract awards with this lever. For example, the stubbornness of a supplier in "annual price negotiations" for a product, in which he feels that he has a monopoly, can result in him receiving a "malus" for a new job in the contract awarding. This method has gotten many "annual price negotiations" moving.[4]

The "most cost-effective offer" and multi-dimensional auctions

A bonus system is nothing other than a multi-dimensional decision-making matrix for selecting a supplier. In addition to the price, various

other criteria are considered and applied to the project (from which the comparison price results). But what distinguished role does the price actually play among these criteria, so that it is precisely the price which is negotiated?

Procurement law stipulates that the bidder with the *most cost-effective bid* be awarded the job. To determine the most cost-effective offer, *contract-award criteria* are often used, which correspond to the criteria of a bonus system. However, the bids of the suppliers are not valuated with respect to money in each criterion (i.e., with absolute or relative bonus), but instead all contract-award criteria including the price are assessed with an abstract number of points. The "most cost-effective offer" is that with the highest number of points. This is only a more abstract form of depicting a bonus system; the decision-making logic is the same.

Another idea is to "disclose" all criteria and make it possible for bidders to modify the characteristics of all criteria during negotiations.

For example, a bidder can also adapt his payment term during an auction. A valuation set in advance of different payment terms determines how this modification affects his comparison price. Certain auction platforms offer this idea as a *multi-dimensional auction*.

Experience tells us, however, that only the price can be adapted in earnest by suppliers during the relatively short time of an auction. All other adaptations of the bid require certain lead times and consequently should preferably be the object of *bonus negotiations* conducted separately in advance.

Bonus negotiations: classic "win-win" in its purest form

The announcement of an auction often produces annoyance and irritation among suppliers.

The supplier fears that the purchaser will only decide based on the price and no longer appreciates the individual performance of the supplier (his *differentiation*). The relationship between purchaser and supplier is often damaged when an auction is held for the first time.

On the other hand, this relationship improves when the purchaser holds negotiations before an auction during which it is solely a question of the characteristics of a supplier in a bonus system. The purchaser has to tell the supplier the total bonus in any case, so that he can refer consistently to a comparison price in the negotiations. Consequently, the purchaser can also announce selected criteria in detail and discuss them with each individual supplier. This includes the framework contract clause mentioned above as well as payment terms or logistic conditions, for example.

If the customer invoices an amount of 100 euros per piece to deliver the goods, then a supplier, who does not pay for this transport, is assigned a "malus" of 100 euros.

If the supplier can arrange the transport for 80 euros per piece, then he should handle the transport and be rid of the "malus". However, if the transport costs the supplier 120 euros per piece, then he should select "malus" instead of handling the transportation. As a result, he can offer a more competitive price in the end. In both cases, the size of the pie between the customer and this supplier is optimized. Each enlargement of the pie is a win-win in a traditional sense, because it benefits both sides.

Incentive for bonus negotiations per "Louis Vuitton Cup"

A hybrid negotiation design, which gives incentives for improving bonus criteria, is the *auction with "Louis Vuitton Cup"*[5]. If purchasers are very interested in it, it is recommended that the suppliers concern themselves in detail with improvement in certain bonus criteria (for example, if the framework contract clause mentioned above should be addressed).

The auction with the Louis Vuitton Cup ends with a Dutch auction with two participants. The one is seeded and the other has to win against all other competitors in an English ticker (the "Louis Vuitton Cup"). This design generates a lot of interest among the bidders in the preliminary stage to be the one, who is seeded for the final round. The seeded bidder need not compete against the others in an English ticker.[6] This great deal of interest can be used perfectly as an incentive for bonus negotiations; the one, who has the best comparison price following the bonus negotiations, is seeded in the Dutch auction. In addition, this method also motivates those bidders to participate, who have emotional reasons against participating in an English auction. From the aversion against the English auction, an additional incentive is created simply to "win" the bonus negotiations.

9.4 Creating incentives for innovation

For a long time, purchasing auctions were considered a negotiation form, which could only be used for procuring simple, comparable goods. Only if the products of the suppliers are interchangeable could suppliers be selected solely by price comparisons. As a result, many companies first procured their *indirect material* with purchasing auctions. Indirect materials are goods, which a company buys for its own use and not for further processing or integration into its own products.

Supplier decisions for indirect material are less critical for one's own business. For example, many companies still swear by traditional auctions to purchase their half-year supplies of printing paper.

The efficiency of negotiations in the sense of a reduced workload can be increased by use of an auction platform on the Internet. This *transaction costs argument* is the essential sales pitch of software companies that offer platforms for industrial purchasing auctions. These Internet auction platforms are used above all for comparable goods or indirect material. Unfortunately, the price for comparable goods does not usually change much in an auction. With comparable goods, there is usually a market price without an auction, which all bidders know. A surprise can rarely be expected from an auction for such material. The other extremes are difficult to describe, for example, complex components such as mechanical parts per drawing (components with complex design drawings) or electronic modules. Today, a decreasing number of purchasing auctions are used here for negotiating prices and as a decision-making mechanism. For example, automobile manufacturers have the widespread practice of demanding strict observance of detailed specifications of components ordered. As a result, comparability is also established for complex goods, and the decision can be made solely based on the price.[7]

In this procedure, however, valuable individual strengths of the different suppliers are not used, which can be rectified using a bonus system. In addition, there are often no detailed specifications for a component available, because suppliers for a component supplier part are usually selected at a time when the component has not yet been defined in detail. At such times, only *function specifications* exist, for which a partner is sought to develop the component. Consequently, the optimum time for an auction is considered to be the end of the development phase of the component supplier part.

Then the required specifications exist to select the producer using an auction. The disadvantage of this procedure is that the development partner, who put a lot of hope in getting the supply contract, is suddenly subject to competition. In this way, numerous fruitful development partnerships of many years between suppliers and customers have been damaged substantially. Consequently, I recommend against auctions for selecting a producing supplier *after* a successful development phase.[8]

Purchasing auctions on the basis of function specifications

Numerous examples show that there is nothing opposed to holding auctions on the basis of function specifications. However, the set conditions must refer to the development work and the supply of components

in the planned scope. Of course, this means a great deal of uncertainty on both sides. How can you choose a development partner simply on the basis of the price? And how should a supplier calculate a component, which he does not know yet?

With respect to choosing a development partner first, the bonus system is what makes an auction into a decision-making mechanism that is economically meaningful. As a result, not only the price is decisive, but instead a combination of all relevant criteria. In bonus negotiations, a development partner can and should sell its distinctive characteristics, especially his innovations. A classic win-win situation is also created here when the work of the supplier is compared with the benefits reaped by the customer with individual product characteristics.

Let's assume that a supplier offers its product not as requested in chrome, but also in a gold-plated model as the sole competitor to do so. The customer appreciates this flexibility and also the quality, but of course is not willing to pay an arbitrarily high price for it. In bonus negotiations, the customer informs the supplier which explicit bonus he is willing to pay for the gold variant. With respect to this product property, he effectively expresses a TIOLI. Customers are rarely willing to negotiate the valuation of the product property with the supplier.

But the option of the supplier to accept or reject the TIOLI[9] itself is worth a lot to both sides. If the supplier finds that producing the gold variant costs him more than the bonus that he gets for it, he renounces the gold variant and only offers the chrome variant. But if it costs him less than the bonus he gets then it is worth his while. Exactly as with the transport costs, the pie is optimized in its size, that is, a classic win-win situation is created.[10]

The second question was how the development partner dealt with his calculation uncertainty.

He was supposed to bid for the supply contract already before the development phase. This uncertainty might actually be very big, but it is much bigger without a supply contract. Then the development partner begins preliminary development work without any certainty of getting the supply contract.

But the calculation uncertainties are nothing other than that of common value, which was discussed in Chapter 6. We also saw there that there are auction forms that protect suppliers from "winner's curse".

Auction design as decision-making mechanism

An especially fine art of auctions optimized from a game theory viewpoint is to leave the decision of whether to choose between a *single-source*

or a *dual-source strategy* as a *decision-making mechanism*, for example. It is a question of the decision of whether one or two suppliers are selected. A dual-source strategy is required if the loss or withdrawal of one supplier entails incalculable risks for the customer, for example, standstill of its own production facilities.

If the differences in assessing the risks of the suppliers cannot be depicted in a bonus system anymore, then the purchaser also has to classify the suppliers. For example, "type I = suppliers, who may win as single-source" and "type II = suppliers, who may not win as single-source." If a type I supplier wins the auction, he gets the complete business. If a type II supplier wins, then he only gets a certain share of the business, and the rest is awarded among the other suppliers. The decision of whether one or two winners are produced in the end is made mechanically and without further influence from the decision-making committee.

In the sense of commitment, this *classification concept* must be known by the suppliers. They must know which type they are and the classification of the other suppliers, whose comparative price is given as a competition argument. Otherwise, the auction lacks commitment due to the classification concept.

After selection of the correct, respectively adapted auction design and with application of the bonus system with and without the classification concept, I have held innumerable auctions for development projects including supply contracts. The development partnerships and supply relationships created were implemented successfully and lucratively for both sides in most cases. However, I would like to share the quote of a purchasing manager from the electronics industry with you. He said, "The relationship is the most important factor in development projects. Consequently, auctions can only be used selectively there. However, you need to 'shake things up a bit' now and then."

9.5 Summary

The bonus system adjusts the competition argument, in that a comparison price is discussed with each negotiation partner in bargaining. A bonus is considered in this comparison price, which honors the characteristics of the negotiation partner that distinguish him from his competitors. A decision is made mechanically based on this comparison price. This increases the intensity of the competition argument substantially.

The determination of a bonus system for concrete contract awards using total value of ownership is an internal, department-overlapping

task for customers, which results in a systematic and documented decision-making process.

You should conduct separate bonus negotiations, in which a win-win situation can be created for the individual criteria, with suppliers before the actual price negotiations. With an auction using a "Louis Vuitton Cup", substantial incentives can be created for bidders to optimize their position in your bonus system and consequently their distinctive characteristics.

Using the bonus system, complex projects for goods and development work can also be negotiated via a purchasing auction. And finally, the win-win optimization in bonus negotiations promotes the will to innovate among suppliers.

10
The Commitment of Negotiation Processes

10.1 Lack of commitment costs money

The role of commitment can already be seen in bilateral negotiations.

Imagine that a purchaser promises to give the order if the seller grants a five percent discount. Such an offer can convince the seller to grant a discount of five percent if he gets the order for sure on the same day. But if the seller says, "Please, give me another five percent. We will decide next week internally whether you get the order with that," then that does not sound anywhere near as attractive to the seller.

Of course, how the request is worded is very important. For example, you can promise the seller that his chances for an internal decision in his favor would be substantially better with a five percent discount. But if the decision is not in his favor, the supplier will certainly remember that.

Many purchasing organizations bet consciously on a high degree of fluctuation in purchasing departments in this context. For a company as a whole, however, it causes long-term damage to its *reputation* for commitment, that is, the credibility of announced commitment. If the commitment or the reputation for commitment has been damaged once, then it is much more difficult to achieve success in negotiations.

On the other hand, it is very worthwhile to forego your financial advantage in individual cases if your reputation for commitment is strengthened by it. Let's assume that an auction has ended with moderate success. A losing supplier then offers via fax a more attractive price than the result of the auction. Accepting the offer would mean additional savings for the purchaser. But it would also mean that the reputation for the commitment of purchasing auctions would be damaged severely. You would get worse prices in the next auction at the least with the same

suppliers. But if you reject the offer, then that supplier would also bid more seriously who had hoped to get in through the back door.

Commitment through contractual fixation

For the purchaser, additional benefits result from the fact that each supplier has to think seriously about his bid in advance of an auction. That optimizes competition among suppliers from the customer's viewpoint.

Maximum competition takes place when the purchaser as auctioneer concludes a binding *auction contract* with each supplier as bidder. This auction contract is a complete supplier contract for the order in question with all details to be regulated. Only the price, which has not been negotiated yet, remains undecided. At this point, the negotiation process, for example, an auction design, is set binding. The bonus of the supplier is also set. After all, there are individually agreed upon details in this contract.[1]

As soon as such an auction contract has been concluded with all suppliers, no one can drop out of the process anymore, neither the suppliers nor the purchaser. All backdoors are closed, and the auction or decision-making mechanism can produce a result almost automatically. Granted, it requires courage from the viewpoint of purchasing to leave the decision completely to an automatic mechanism. But the combination of bonus system and auction design provides the purchaser with sufficient adjusting mechanisms to set the conditions of the auction in such a way that it produces the best possible result for him.

However, a mandatory prerequisite for this is the conscientious and skilled preparation of the auction. Such an auction certainly does not involve less work than conventional negotiations. However, the result of the negotiations would justify the work. Compare the situation with a contract award in line with procurement law; the law stipulates there how the bidding and decision-making processes should be conducted. Each bidder can rely on that, because if the public agency does not observe this process, the result of the call for bids could be contested. For this reason alone, each competitor knows exactly when he should submit his final, best bid. A similar effect can only be achieved in a private enterprise context with an auction contract.

The weapon becomes blunt without commitment

The experience, for example which the automobile industry made with non-binding online bidding events, speaks for itself. Project volumes for automobile component suppliers were and often are negotiated by automobile manufacturers via online bidding events in the three-figure

million range, and even for billions now and then. It is understandable that the automobile component suppliers become subject to price pressure simply due to the importance of the orders.

Automobile component suppliers have learned the following over the years: If they get involved in a price war as bidder in a non-binding bidding event, then they destroy their margin regardless of who gets the order in the end. Then all of them, whose prices are not far from the winner, still have a certain chance to get the order. But if they do not get involved in a price war and their bid prices are very similar, then each single one of them has the same chance to get the order as after a price war – and the margin has been saved. In other words, a non-binding bidding event is an invitation to the bidders to behave collusively.

The automobile manufacturers have learned from this experience. They hold far fewer online negotiations than a few years ago. On the other hand, they have recognized the value of reputation for the commitment of online negotiations. But professing faith in this commitment is not sufficient.[2] Companies in other industries have been holding *real* purchasing auctions successfully for years, that is, purchasing auctions with commitment. These companies apply transparently communicated bonus systems to depict the relative valuation differences between bidders in reaching a decision. And they back up the commitment of their purchasing auctions by concluding an auction contract with all bidders before an auction.

The burned ships of Cortez

The strategy to conclude an auction contract binding for the purchaser corresponds to the famous burned ships of Cortez from the viewpoint of bargaining theory. Hernando Cortez was a Spanish conquistador, who landed in Mexico in 1519. Before he took up battle against the Aztecs, he burned his own ships. As a result, he consciously destroyed his possibility of retreat. This signaled his absolute will to win to the Aztecs and motivated his own army in the form of an ultimatum at the same time. Game theoreticians talk about the "burned ships of Cortez".[3]

Most automobile manufacturers have progressed so far today that they talk about the commitment of their purchasing auctions. But they have not gone so far as to "burn their own ships" yet. They still leave the backdoor open to select another bidder after all as winner in individual cases. As long as this backdoor is used now and then, the reputation for commitment is damaged substantially time and time again.

You remember the utility company of section 5.4 that executed a Dutch auction as a simultaneous negotiation in order to award power

station turbines. One bidder claimed to confirm a price step after the auction had already been closed due to another bidder's confirmation. The information that the auction was finished and the winner identified had already circulated among all bidders. Within minutes the utility company needed to make a decision whether the new offer was acceptable or not. At stake was a two-digit million euro offer. Have you made up your mind about what your decision would have been?

The utility company had signed an auction contract with both bidders in which the complete process, including the exact time interval of each ticker step, was described precisely and which obliged the utility company to execute the process accordingly. This did not leave them a choice. They had to reject the new offer and give the order to the first bidder. Otherwise, the first bidder would have been able to sue the utility company for neglecting the auction contract, which means that the nearly unsolvable stalemate situation was effectively not a decision problem.

The decision that was anticipated by the auction contract was in fact the only right one. Not least because of the existence of the auction contract it had to be assumed that the second bidder waited consciously to the end of the first ticker step. Unlike his competitor, he did not bring the bidding form already filled in for this ticker step. At the point of time when he filled it in, he already knew that there was a competition offer for this ticker step. The utility company definitely had to assume that the second bidder was consciously planning not to bid before knowing about some competitor's confirmation. He obviously speculated on participating in a tie round between two bidders that had confirmed the same price step. This is, however a bidding scheme that foils the idea of a Dutch auction altogether. In case of an auction contract, these bidding tactics are not really a good idea.

10.2 Who wants to bid against himself?

A rather critical aspect of lack of commitment of auctions is the danger for suppliers to bid against a phantom. A few suppliers suspect that industrial purchasers have sometimes submitted their own bids in online bidding events. As long as it is a question of non-binding bidding events, nothing can be done against this.

It becomes especially subtle when it involves a dynamic English auction with information about rankings. Remember that in such an auction, the bidders do not learn the prices of the other bidders, but instead only which ranking their own bid has. This is either shown as

a number or even by the colors of traffic lights. I experienced one case in which the purchaser admitted after the auction that he had manipulated the traffic light colors during the auction. He used this "feature" to increase the dynamics of the course of the auction. This purchaser was not conscious of doing anything wrong. He did not submit any bids himself (at first glance). But the fact that he deluded the others with a non-existence competition argument seemed to be normal negotiation behavior for him.

A supplier can only protect himself against such behavior by demanding commitment in an auction. In a binding auction, you can be rather certain that the purchaser does not submit any bids of his own or manipulate colors. He would be taking a substantial risk of winning with his own bid in the end. In the case of the rankings or traffic light auction, the analog result would be that no bidder is in first place or set to the color green at the end. But if the purchaser also has an auction contract binding for him,[4] then he has a problem. He cannot enter into business with any of the bidders. Otherwise, he discloses that he broke the auction contract.[5]

The difference between reservation price and phantom bid

We identified the reservation price as a bid controlled by the auctioneer, which acts like an additional bidder.[6] What differentiates it from a *phantom bid*, that is, manipulation of the auction by a bidder?

The small but decisive difference is that the competitors are aware of the *existence* of a reservation price. You can lodge a sealed reservation price at a notary public before the start of an auction to prove that there is no manipulation there.

But it actually makes a lot of sense to permit the auctioneer to correct his indifference price and consequently his reservation price during an auction if it is a question of common value in a make-or-buy decision. The decisive factor is only that the bidders know at any time during an auction whether the reservation price has been reached or not. The auction is only binding once it has been reached. This should be regulated in an auction contract.[7]

The problem of a *phantom bid* is not only presented in a dynamic English auction. Phantom bids would also contravene the binding nature in an English ticker auction or a second-price-sealed-bid auction and consequently may not occur in the context of an auction contract. The situation is different for first-price-sealed-bid auctions or Dutch auctions. A phantom bid would not make any sense there, because it would not have any influence on the other bids.

First-price-sealed-bid auctions with only one bidder?

But the question is interesting of whether you can hold a first-price auction if only one single bidder participates. You should obviously avoid a second-price auction in such a case.

In purchasing auctions, only a closed circle of participants can normally take part. Purchasers have to know with which potential suppliers they are dealing to be able to assess whether they really want to allow them to participate in the auction.

Consequently, a closed group of bidders is even a prerequisite for the commitment of a purchasing auction. The bidding strategy in a first-price auction essentially depends on the assessment of the competitors, which a bidder makes.

If a bidder is the sole bidder permitted to take part in an auction, then it is best if he does not know it. Only when he does not know that can the auction be held with success anyway. Whether it becomes successful depends on which assumptions the one bidder makes about other ones. It often happens in contract awards that only one single bidder is really permitted to participate. Of course, this one is asked to submit a bid without telling him that there is no competition for him to fear. The extent to which a customary round of bids is already declared as the ultimate and final round and still "lives", that is, it is played out as a first-price-sealed-bid auction, is subject to various, overlapping interpretations. In any case, a first-price-sealed-bid auction with only one bidder is not especially bad.

Dutch auctions with only one bidder are unfortunate

A Dutch auction (with one auction item) can also be seen as the theoretical equivalent of a first-price-sealed-bid auction. The bidding strategy is essentially the same. The competition argument is not cited explicitly there either, but instead the bidder has to assess it himself. Not mentioning that there is no other bidder is of course understandable from the viewpoint of the purchaser.

However, the situation in a Dutch auction has an unsavory aftertaste. Imagine that a bidder reduces his bid price drastically to be able to confirm a Dutch ticker as early as possible.

Then he learns that he was the only participant in the ticker. It would be easy to understand if such a bidder were angry about the method used. When I held Dutch auctions with only one bidder in individual cases, then these only came about due to special situations, for example, when the second bidder decided not to participate shortly before the

auction. Normally, Dutch auctions with only one bidder contravene a code of honor, which auctioneers should subscribe to on their own. Such a code of honor also pays off in auction success in the long-term. The fact alone that a Dutch ticker is being held is a reliable signal to bidders that there are other bidders.

Sell your own weakness as a strength

I was once forced into a rather precarious situation to employ a type of negotiation judo[8] trick to prevent a threatened catastrophe.

Everything looked simple at the start. The prices for two product generations of a component supplier part were to be negotiated for a company's product. The current supplier could consider himself a monopolist for the current product generation, because a switch would have been exorbitantly expensive. The brand name of the supplier was even noted on the packaging of the company's product. There were appropriately negotiated prices, but the purchaser had new savings targets and consequently wanted better prices if possible.

There were no prices yet for the next product generation, but there were a few alternative suppliers. The standard operating procedure in such a situation is to announce an auction for the requirement of the second product generation. The supplier for the first product generation was told in preliminary negotiations that he would only participate in the auction if he reduced his price for the first generation. Thus this procedure is a "hybrid negotiation" form of a TIOLI[9] and an auction.

While we were preparing the auction and the details for the preliminary negotiations, we received new information. The packaging for the new product generation was already being produced. Totally in line with the preceding generation, the brand of the component supplier part was mentioned again – the brand name of the old supplier. Under these circumstances, we could not hold a binding auction in any case. If a different supplier had won, there would have been excessive costs for changing the packaging for the second generation.

The solution was as follows: We not only told the supplier the price we wanted for the first generation, but also the one we wanted for the second generation. If he accepted this ultimatum, we would not hold an auction. But if he rejected this ultimatum, we would hold a binding auction. Consequently, this ultimatum was a *TIOA*, that is, "*take it or auction*". We told him that the auction had already been prepared completely. We selected a Dutch auction as the auction design.

What he did not know is that if he had really rejected our TIOA, then we would have held a Dutch auction with him as the sole participant.

But this did not happen, because he accepted our TIOA. Because we could not take too much of a risk, the demanded price was acceptable to him. Against the background of the overall situation, it was an impressive success for us.

10.3 Negotiations with subcontractors

When our building contractor calculated the costs for the cafeteria construction[10], he had to make a few assumptions. From the integration of a planning agency to procurement of construction materials and all the way to the awarding of a few construction and skilled trade services, he had to estimate the conditions of numerous subcontractors. Because he knew his business well, he had a good sense of reasonable prices for the individual goods and services. But he did not have complete calculation certainty. When he had to cut prices by 100,000 euros overnight, he reduced the prices for a few skilled trades, the conditions of which he had calculated rather generously. He was certain that he would be able to get these reduced prices from his subcontractors as soon as he had the order.

The strategic question, which every supplier is faced with when submitting a bid for an order, is should you already select the subcontracts in question and negotiate conditions with them while you are still in the bidding phase? Or do you wait until you get the order?

The course of action of the building contractor is very plausible at first glance. The best conditions can certainly be gotten with subcontractors once you have the order for sure. But the building contractor then has uncertainties in his calculation and consequently a certain risk. If he cannot get the assumed conditions, he might wind up with a negative result for this project.

Another alternative would be to negotiate with the subcontractors before you are sure of getting the order. You could even already select the subcontractors, but with the proviso that you get the order yourself. This would create the maximum possible competitive pressure among the subcontractors before you get the order. The commitment to award the jobs is only restricted by this proviso. The conditions achieved would result in the theoretically best possible bid with calculation certainty.

The trade-off of the two alternatives[11] involves pitting certainty against risk.

The chances of getting the order with a reliable calculation are best in the second alternative. However, no further price reductions can be negotiated with the subcontractors once you get the order, because they were

already set binding previously. In many companies, this situation results in an especially unfortunate situation. Typically, the purchasing conditions with subcontractors are known to sales. Sales considers winning the order as its most important objective and consequently makes its calculations based on the cited purchasing conditions and without any margin worth mentioning. But the fact that the purchasing conditions cannot be negotiated further is something that is not communicated internally to sales. As a result, the project might be won, but it will most probably not produce any profit.

In the first alternative on the other hand, a competitive offer can only be made using uncertain calculations. But all negotiation leeway still exists here after an order is received to put more pressure on the conditions of the subcontractors than in the second alternative.

To strike a balance is usually the best alternative

A plausible and practical recommendation in most situations[12] is to strike the following balance between the two alternatives: You should secure conditions with subcontractors in any case to limit the uncertainty of your calculations. But these preliminary negotiations should take place without binding selection of subcontractors to maintain competition at a maximum for the phase after you have received the order. For example, one variant is to conduct preliminary negotiations as *quote-for-ranking*; each subcontractor submits a binding offer, whereby you promise to speak with the subcontractors after you receive the order in the sequence of the submitted offers (the best first, etc.).

If you get an order with your bid, then the subsequent negotiations with the subcontractors can be held as a TIOLI chain, for example, in the already set sequence. The *TIOLI chain* is a sequence of ultimatums to various negotiation partners, which ends as soon as one accepts the ultimatum presented him. This method normally results in an attractive margin.

10.4 The game with lack of commitment

I got to know a striking interpretation of commitment in online negotiations from the viewpoint of the bidder side. The purchaser announced a dynamic English auction for a project with a volume in the three-figure million euro range. The commitment of the auction was promised firmly several times. The best bidder would get the order in any case, unless a certain sealed target price was reached. The purchaser reserved the right in such a case to stop the auction and to award the contract

to one of the bidders, who had bid below the target price, of his own choosing. Consequently, this target price was a kind of inverted reservation price.

With a reservation price in a purchasing auction, there is only commitment when a price is bid lower than the reservation price and not when it is above it. It was the opposite here; the commitment only applied above the target price, but not below it.

Apparently, the priority of the customer was reversed when the target price was reached. After that, free choice of his favorite supplier was more important than additional savings. Actually, a great deal of skill in thinking abstractly and discipline are required by decision-making committees in purchasing companies to recognize this changing priority in advance when the target price is reached and consequently to announce the discontinuation of an auction when the target price is reached. But in the end, this "target price rule" reflects the lack of ability not to intervene in decision-making.

"Russian roulette" with the target price

The auction effectively became a bidding event without commitment from the start. The bidders did not know at which price level the target price rule would apply. The target price reminds us of a bullet in a revolver during Russian roulette, of which none of those playing the game knows whether a real bullet will be fired at the next shot. In the auction, each new bid had to be submitted under the assumption that it might result in exceeding the target price and consequently in lack of commitment of the event.

But that is just as good as lack of commitment itself. In fact, all bidders behaved with a lot of reserve from the start. The auction took several hours. The design of auction dynamics provided a lot of options for drawing out the auction without notable price reductions. We were obviously not the only ones to recognize and use these options. The auction became a war of nerves, including for the customer.

From a certain time point, we were able to get out of the dynamics of the course of the auction, because there was still only one other bidder competing with us. The bidding time was always extended by ten minutes when the best bid was improved. Always when the best bid was not submitted by us, we waited until a few seconds before the bidding deadline ended to improve our bid a little bit. Then we were always outbid promptly. That could only mean that there was exactly one "prompt bidder", because otherwise the two "prompt bidders" would have submitted mutually lower bids.

In this situation, we called the purchaser and told him that we still had approximately ten percent leeway until our internally approved limit. We offered to reduce our next bid by the total ten percent if he promised to discontinue the auction and give us the order. But without his promise to honor this agreement, we would drop out of the auction immediately. He gave us his word, we reduced the price by ten percent, he discontinued the auction with reference to the target price rules, and we got the order. We never learned whether he actually reached his original target price with that.

The bottom line of this example is that it pays to demand commitment. But this is rarely practiced, which is why the temptation is very great to demand concessions without promising any commitment. If this succeeds, you of course have gained a big advantage.[13]

Playing with and without commitment: the Far Eastern art of negotiation

If you have ever dealt with a negotiation delegation from the Far East, then you certainly noticed that usually the lowest ranking representative present does the talking. The boss often does not say one word during the complete meeting if he is in the room at all. The reason is simple.

For example, he cannot make any expensive concessions. Everything, which the lower ranking negotiation partner achieves, is achieved without the commitment of the boss. But the same negotiation behavior also underpins commitment perfectly when it is needed. For example, if the delegation delivers an ultimatum, this was of course decided personally by the boss in the background. But he is not the one who formulates the ultimatum. Again, the lowest ranking person presents the TIOLI[14] and at the same time makes is clear that if he reports a rejection of the TIOLI, he will not only lose face, but perhaps his job too. Then negotiations cannot be continued in any case. Consequently, commitment is communicated by delegating handling of the negotiations.

10.5 A plea for long-term decisions

A special aspect of commitment is the question of the term of an agreement. Current decisions, which must be made in a short time, can be made binding with relative ease. One-shot investment measures such as construction projects are a typical example of this. Commitment becomes much more difficult when prices of a component supplier part are discussed, which should be supplied for a few years.

There are several advantages for purchasing when the prices can be negotiated for the years ahead in one single round of negotiations. On the one hand, this is the topic of strategic demand reduction on the side of the suppliers, which has been addressed several times in this book. The more frequent price negotiations and supplier decisions are, the higher the incentive for suppliers to behave collusively. The longer the negotiated period, the stronger the one-shot character of the negotiations and consequently the smaller the incentive to act collusively.

The second big advantage involves understanding a longer time period as *bundling over time*. The "bundling" is one of the safest and easiest methods in purchasing to get better prices. When you combine several requirement periods, then the negotiated volume becomes bigger and better prices are possible thanks to the effects of economies of scale.[15] Bundling achieves a similar effect over a long time period. Thanks to the higher order and price security, a supplier can calculate more keenly.

In spite of all of these advantages of a long time period, commitment extending far into the future is rather rare. The most common reason for this is the uncertainty. You cannot know how prices will develop in general, and consequently you cannot set your prices for years to come. This argument becomes especially relevant when the supplier in turn is dependent on a sub-supplier market, which is known for a great deal of dynamics. Typical examples are cyclical raw material prices such as silicon in the electronics industry, wood for paper production or diesel for logistics, and so on.

Very few negotiation partners realize that it is an advantage for both sides to split the uncertainties of the raw material market in the form of chances and risks equally among both. Against this background, the most unfortunate agreement I have seen was in a logistics contract.

The transport company in question let itself be pressured into signing a framework contract valid for several years including conditions with its most important customer. The order was very lucrative for the transport company at first glance, because it signified a secure order volume for several years. But the transport entrepreneur underestimated the effect of the following clause: "Should the diesel price change considerably during the term of contract, financial compensation can be negotiated. The validity of the rest of the agreement shall not be affected by this."

For a negotiation theoretician, it is incomprehensible how anyone can even write such a clause, never mind sign it. If the existing agreement remains valid, then there is nothing to negotiate no matter how much the diesel price increases. In fact, the transport company was close to bankruptcy a few months after signing the contract.

Negotiations with the customer about the passing on of diesel price increases had come to a standstill. For the transport entrepreneur, a non-binding agreement would really have been better than this one, which – although it provided him with order security – caused him losses. The end of the story is that the customer could not insist on the agreement, because it would have lost his logistics partner due to bankruptcy. Consequently, the agreement was dissolved by mutual consent and reworded.

The sliding price clause makes long-term commitment possible

In this situation, both parties were recommended to agree on a sliding price clause. The sole prerequisite, which must be fulfilled for agreeing on a sliding price clause, is the availability of an independent price index for the raw material in question. This had to be determined and published at regular intervals by an objective authority accepted by both sides. You then agree in a sliding price clause how the negotiated price is adapted over time when the price index changes.

In this, every intermediate form is possible from a gradual to a complete assumption of the raw material price risk by the customer. In the case of the logistics agreement, they agreed on adapting the conditions quarterly in line with the diesel price index. Consequently, the transport company continues to bear the short-term part of the risk. However, it can now calculate long-term with secure price adjustments.

The buyer of special lacquers of an automotive supplier you already met in section 8.3 was used to agree on sliding price clauses concerning pigments with his suppliers. This precursor material is extremely unpredictable in its price development and has a big share in the price of the lacquer. But the market of pigments is not exactly transparent to outsiders, not even to automotive suppliers. The competence to get a competitive price for pigments is a core competence among lacquer producers. A sliding price clause for this raw material, however, deprives the lacquer producer of any incentive to prove this market competence or to pass his success on to the client. In this case, a sliding price clause for precursor material should be avoided. As it is usual for other products with similarly volatile markets (e.g. paper), we here recommend arranging sliding price clauses on the complete product price. The price is connected with an index for the product concerned, in our example the lacquer. Although this is not a risk sharing model concerning precursor material prices anymore, it still gives both parties the security that with their long-term price agreement they will not move too far away from the general market.

Avoid buying "popcorn at the movies"!

Despite all advantages that long-term commitment provides in the end, it of course also has its risks. Imagine a development project that was negotiated using an auction. The supplier calculated with a very narrow margin due to the substantial pressure of competition. A contract was concluded, and the project began. Then the customer discovered that his specifications had to be changed here and there. The supplier was of course flexible. He took all changes into consideration and charged a very high price for them. The additional charge, which he could demand for the subsequent changes, was characterized by a monopoly margin.

That reminds us of an example provided by Tim Harford, who explained in *The Undercover Economist* why popcorn is so expensive at the movies. People go to the movies because of the film they want to see. Nobody looks for a cinema based on how much they charge for popcorn. But once the person is there and has the munchies for popcorn, then the cinema owner of course has the monopoly for selling popcorn. It is soon obvious why the cinema owner can demand any price for his popcorn. His only competitor is the price limit at which the moviegoer decides that he does not want popcorn that much after all.

Do you see the parallel to the subsequent changes of specifications in an existing supplier agreement? The customer has to accept the monopoly margin if he needs his changes subsequently. Fear of this situation is one of the reasons why many auction experts still demand today that a requirement must be described precisely to be able to negotiate it in an auction. The better this requirement is described, the less the risk of having to pay subsequent monopoly margins for many changes.

This argument is based on the idea that you could exclude subsequent changes if you only describe the requirement sufficiently precisely. Unfortunately, the opposite is the case in actual practice. There are changes in every case. But the more precise a requirement is described, the better a supplier can demand his monopoly margin. The best weapon against monopoly margins when there are changes is consequently the exact opposite: A call for bids on the basis of specifications stated as generally as possible.

As we saw in section 9.4, auctions on the basis of function specifications are even possible.

Company decisions are becoming increasingly shortsighted

Decisions concerning a long time period are deliberately being made increasingly rarely. Only a few years ago, the "law of men in their 50s"

applied in management.[16] It stated that managers in their 50s did not make any decisions with a view to the future anymore. After all, they could only reap the success of their decisions for about ten more years. This observation seems to have become outdated long ago in a frightening way. Today, there is hardly any manager – regardless of his age – who can expect to work for the same company in only five years, not to mention has the same job in the company. Each is assessed using increasingly short-term objectives. But short-term success justifies disproportionately high risks in the distant future.

The purchasing manager of an automobile component supplier explained to me that he considered this to be one of the great calamities of our time. For example, whenever a supplier decision was made which signified a commitment for several or more years, then only the short-term success was considered anyway. The purchasing manager astounded me with his consistent, unconventional philosophy in the context of at a contract award for a seven-year project. First, it was easy to convince him to set the binding prices with the suppliers for the complete project term. The suppliers each based their decisions on different learning curves. In line with his learning curve, each one could set his individual course of prices. The deciding criterion for the purchaser was to keep the accumulated expenses as long as possible during the complete project term. He drew up a quantity forecast for this, which he of course also provided to the suppliers.

According to all laws of economics, I would have recommended to project the different, expected expenditure flows with a *net-present value* calculation to the present. Each single euro, which is to be paid in the future, is worth less than one euro today due to the effect of interest. You discount the future. This is self-evident in valuation theory. In other words, this means that the present is the most important in reaching a decision. The future has increasingly less importance in a decision the more distant it is.

The mentioned purchasing manager, who knew these relations precisely, decided to conduct the comparative cost calculation of the various offer prices of the suppliers without discount factor. We simply compared the sum total of all payments over seven years. His argument was as simple as it was pragmatic. The project would contribute to the year-end result for seven years. The shareholders would only look at the year-end result each year during those seven years. The expenditures saved in one year would neither be reinvested nor would a loan be taken for reduced revenues. The shareholders did not "remember" anything from one year to the next. With this method, the purchasing

manager effectively left the shortsightedness of the shareholders out of account and gave preference to the course of prices, with which the project produced solid results for seven years.

10.6 Summary

Bidding events without commitment result in collusive behavior among bidders and normally produce a much worse result for the auctioneer than auctions with commitment. Without commitment, bidders can imagine that the auctioneer is manipulating the auction with his own bids or even letting bidders bid against themselves. If an auctioneer actually does get in the unfortunate situation of holding an auction for a contract award with only one bidder, a first-price-sealed-bid auction is to be preferred over all other auction forms.

Negotiations with subcontractors for an order, for which you are also bidding, should begin during your own bidding phase to increase your calculation security. But you should only make a final decision once you have gotten the order, so that optimum conditions with the best margin for you can be negotiated.

Whoever succeeds in negotiating successfully without providing any commitment of his own might have a big advantage ("without providing any commitment of his own" especially means that he need not make any concessions). Consequently, the temptation is great to negotiate with or without commitment and is attempted all too often.

Consequently, the following rule applies: Commitment must be demanded. Long-term decisions can also be negotiated with commitment if you split the risks among negotiation partners and see a mutual advantage in setting secure conditions for the future.

Appendix

Brief Profiles of the Discussed Negotiation and Auction Forms

No.	Negotiation and Auction Forms	Negotiation Items	Page
1	"Meet Halfway"	One Object	
2	Sealed Exchange of Offers	One Object	
3	"I Cut – You Choose"	Inhomogeneous, separable quantities	
4	Negotiation judo	Different interests	
5	Ultimatum Game(TIOLI, "Take it or leave it")	One object or non-monetary interests/quantity	
6	Dynamic English auction	One object	
7	First-price-sealed-bid auction (American tender auction, pay-as-bid auction)	One or several equal units	
8	Dutch tender auction	Several equal units	
9	Second-price-sealed-bid auction (Vickrey auction, (n+1)-price auction)	One or several equal units	
10	Dutch (multi-object) auction	One or several objects	
11	English ticker auction (Japanese auction)	One or several equal units	
12	Clock auction	Several objects	
13	Brazilian auction	Several equal units	
14	Hong Kong auction	Several equal units	
15	Simultaneous ascending auction	Several objects	
16	Dynamic combinatorial auction	Several objects	

No.	Negotiation and Auction Forms	Negotiation Items	Page
17	Klemperer auction (Anglo-Dutch auction)	One or several equal units	
18	Hong Kong–Dutch auction	One or several equal units	
19	English Light auction	One or several equal units	
20	Auction with "Louis Vuitton Cup"	One or several equal units	
21	Hybrid negotiation forms composed of a TIOLI and an auction	One or several objects	
22	TIOA ("Take it or auction")	One object	
23	Hybrid negotiation forms composed of a quote-for-ranking and a TIOLI chain	One object	

1 "Meet Halfway"

Negotiation item	One object
Sales or purchasing	Bilateral negotiation between seller and buyer
Negotiation design	The negotiation partners agree to select that division of the *pie* interpreted as relative to the *threat point*, which corresponds to the "fair middle".
Commitment	A mediator can be used for determining the "fair middle".
Bidding strategy	Not relevant.
Signals between bidders	The method is only possible if the indifference prices of the bidders are known by all.
Winner's curse	Not relevant
Result	If the *threat point* is symmetrical, the result is halving of the pie.
Special features	"Meeting halfway" corresponds to the *Nash solution* of *cooperative bargaining theory* with matching utility functions.
Internet	Not relevant.

2 Sealed exchange of offers

Negotiation item	One object
Sales or purchasing	Bilateral negotiation between seller and buyer.
Negotiation design	The negotiation partners each note their asking price. A neutral person checks whether the prices *intersect*. If the prices intersect, then the middle between the prices is accepted. If the prices do not intersect, then the negotiations are discontinued.
Commitment	The method only works if the discontinuation of negotiations when prices do not intersect is accepted by both sides as binding.
Bidding strategy	To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own *risk aversion* and your assessment of the other person. In this, the seller adds the strategic margin to it, and the buyer subtracts it. The lower your own risk aversion and the further away the indifference price of the other person (or your estimation of it), the bigger the strategic margin.
Signals between bidders	Not relevant.
Winner's curse	Not relevant.
Result	A sealed exchange of bids leads an asymmetric negotiation situation with unknown indifference prices into a symmetric situation with known (remaining) pie. This is divided in the middle.
Special features	A sealed exchange of bids is the most simple negotiation form of *non-cooperative bargaining theory*. It is not suitable for securing one-side negotiation success. Instead, it is an efficient method for generating fair solutions.
Internet	Only possible with help of a trust center.

3 "I Cut – You Choose"

Negotiation item	In homogeneous, separable quantity
Sales or purchasing	Bilateral, non-monetary negotiations.
Negotiation design	One of the two negotiation partners divides the pie into what he considers two equal pieces. The other negotiation partner selects one piece in turn according to his valuation.
Commitment	Not relevant.
Bidding strategy	Not relevant.
Signals between bidders	It can be an advantage for both if the dividing negotiation partner knows the valuation of the other too.
Winner's curse	Not relevant.
Result	A division, which is certainly accepted by both negotiation partners.
Special features	A generalization of this principle to more than two negotiation partners is possible, but very complex and can hardly be used in actual practice. The method has seven steps with three parties. A method is known with 20 steps with four parties.
Internet	Not relevant.

4 Negotiation Judo

Negotiation item	Different interests
Sales or purchasing	Bilateral, non-monetary negotiations.
Negotiation design	The negotiation partners sound out different interests and venture to make concessions on individual points. "Negotiation judo" in this context consists of each partner compelling his counterpart to settle for a high price for a *must-have*, which actually is not one.
Commitment	Not relevant.
Bidding strategy	Not relevant.
Signals between bidders	It is an advantage to make a *must-have* credible to other, although it is not really one.
Winner's curse	Not relevant.
Result	An agreement under consideration of different interests.
Special features	Negotiation judo only works with asymmetric information.
Internet	Not relevant.

5 Ultimatum Game(TIOLI, "Take it or leave it")

Negotiation item	One object or non-monetary interests/quantity
Sales or purchasing	Bilateral negotiation between seller and buyer: also possible in non-monetary negotiations.
Negotiation design	One negotiation partner makes an (aggressive) offer and threatens to break off negotiations if the other does not accept the offer.
Commitment	Only works if a *reputation* for commitment exists.
Bidding strategy	Aggressive offer; should not be overdone. Depending on the context, culture and economic situation of the other, the other should still get 5 to 20 percent of the pie.
Signals between bidders	The ultimatum can be supported by *brinkmanship* or a *trembling hand*, for example.
Winner's curse	Not relevant.
Result	In spite of a possible symmetric situation a priori, very nice negotiation success can often be achieved with a TIOLI. But you can also get burned with it!
Special features	Every situation of someone making prices is a TIOLI, for example, all prices in a supermarket. The invitation to an auction is also a TIOLI.
Internet	Possible via e-mail.

6 Dynamic English Auction

Negotiation item	One object
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders underbid each other mutually using a *design of auction dynamics* until no bidder submits another bid. In the variant *proxy auction*, a bidder can lodge his highest bid with the auctioneer, who only discloses it if it is outbid by another bidder.
Commitment	Usually exists with manual sales auctions. It often does not exist in purchasing auctions for contract awards on Internet platforms.
Bidding strategy	To bid precisely to your own indifference price and then give up. Different design of auction dynamics might make slight tips and tricks possible to generate additional information.
Signals between bidders	Possible depending on the design of auction dynamics
Winner's curse	Depending on the design of auction dynamics, information might be exchanged between bidders, which helps to avoid winner's curse.

6 Continued

Result	The bidder with the highest indifference price wins with (approximately) the second highest indifference price.
Special features	Most widespread auction form today, but questionable in a professional context, because the price is often not reached in a rational manner. The generalization of the dynamic English auction to several objects is called a *simultaneous ascending auction*.
Internet	Possible both manually and on Internet platforms.

7 First-Price-Sealed-Bid Auction (American tender auction, pay-as-bid auction)

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders submit a sealed bid. The bidder with the highest bid wins the auction at the price he bid. When there are several units, the bidders with the highest bids each get the item at the price they bid respectively.
Commitment	Without commitment, this is nothing other than a very normal "final bidding round" as it often occurs in actual practice.
Bidding strategy	To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own *risk aversion* and your assessment of the competition. The lower your own risk aversion and the lower your estimation of the competition, the higher the strategic margin.
Signals between bidders	Not possible.
Winner's curse	Information cannot be exchanged between bidders, i.e., the danger of winner's curse is not avoided.
Result	The bidders with the highest bids (= indifference price minus strategic margin) each get the item at the price they bid respectively.
Special features	The most common auction form in addition to the dynamic English auction. (European) procurement law prescribes this auction form in *calls for bids*. When there are several units, it corresponds to the American tender auction, which is known in money transactions between banks as an *variable rate tender operation*.
Internet	Rare, because commitment is difficult to be made plausible.

8 Dutch Tender Auction

Negotiation item	Several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders submit a sealed bid. The bidders with the highest bids win the items at the n-highest price.
Commitment	Hardly imaginable without commitment
Bidding strategy	To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own *risk aversion* and your assessment of the competition. The lower your own risk aversion and the lower your estimation of the competition, the higher the strategic margin.
Signals between bidders	Not possible
Winner's curse	Information cannot be exchanged between bidders, i.e., the danger of winner's curse is not avoided.
Result	The bidders with the n-highest bids (= indifference price minus strategic margin) win the items at the n-highest bid.
Special features	The Dutch tender auction and the *American tender auction* are practiced between banks as an *variable rate tender operation*.
Internet	Rare, because commitment is difficult to be made plausible.

9 Second-Price-Sealed-Bid Auction (Vickrey auction, (n+1)-price auction)

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders submit a sealed bid. The bidder with the highest bid wins the auction with the second highest bid as price. When there are several units, the bidders with the n-highest bids get the items at the (n+1) highest price.
Commitment	Difficult to imagine without commitment
Bidding strategy	To bid precisely your own indifference price.
Signals between bidders	Not possible.
Winner's curse	Information cannot be exchanged between bidders, i.e., the danger of winner's curse is not avoided.
Result	The bidders with the n-highest indifference prices get the items at the (n+1) highest indifference price.
Special features	Plays a subordinate role in actual practice, but an outstanding role in theory (Nobel Prize for its discoverer Sir Vickrey).
Internet	Hardly possible, because commitment is difficult to be made plausible. The expenses of a required *trust center* speak against this. Ironically, eBay is effective with precisely this auction form, however, via the roundabout way of a "prevented" dynamic English auction with a fixed end time of the auction. Commitment is accounted for here, because eBay plays the role of a trust center.

10 Dutch (Multi-Object) Auction

Negotiation item	One or several objects (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The auctioneer reduces the prices in previously set increments (*ticker*) until the winner confirms the price. If there are multiple objects, the bidder confirming the price can select how many objects he buys for this price per object.
Commitment	Hardly imaginable without commitment.

Continued

10 Continued

Bidding strategy	To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own *risk aversion* and your assessment of the competition. The lower your own risk aversion and the lower your estimation of the competition, the higher the strategic margin.
Signals between bidders	Not possible.
Winner's curse	Information cannot be exchanged between bidders, i.e., the danger of winner's curse is not avoided.
Result	The bidders with the highest bids (= indifference price minus strategic margin) each get the item at the price they bid respectively.
Special features	A rare auction form today, but which is slowly becoming fashionable both for contract awards between companies as well as in Internet auctions (www.azubo.de, www.hood.de) open to everyone. The variants *full step* and *sudden death* deal differently with two confirmations of the same price increment.
Internet	Possible manually, e.g., via phone or fax, or on an Internet platform.

11 English Ticker Auction (Japanese auction)

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The auctioneer reduces the prices in previously set increments (*ticker*) until n-winners remain.
Commitment	It does not always exist in purchasing auctions for contract awards on Internet platforms, but highly recommended.
Bidding strategy	To bid precisely to your own indifference price and then give up.
Signals between bidders	Not possible.
Winner's curse	At the "counting down" the number of remaining bidders, that information is exchanged between bidders, which best prevents the danger of winner's curse.
Result	The bidders with the n-highest indifference prices win with the (approximately) (n+1) highest indifference price as price.
Special features	Highly recommended for reaching respectable prices in a professional context.
Internet	Possible both manually and on Internet platforms.

12 Clock Auction

Negotiation item	Several objects (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Parallel running *English ticker auctions*, one per object.
Commitment	It does not always exist in purchasing auctions for contract awards on Internet platforms, but highly recommended.
Bidding strategy	To bid precisely to your own indifference price and then give up.
Signals between bidders	Not possible.
Winner's curse	At the "counting down" the number of remaining bidders, that information is exchanged between bidders, which best prevents the danger of winner's curse.
Result	The bidders with the n-highest indifference prices get the items with the (approximately) (n+1) highest indifference price as price.
Special features	Only recommended when *substitutes*/*complements* do not play any role among the auction items.
Internet	Possible both manually and on Internet platforms.

13 Brazilian Auction

Negotiation item	Several equal units
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The auctioneer increases the quantity to a fixed total price in previously set increments (*ticker*) until the winner confirms the quantity.
Commitment	Hardly imaginable without commitment.
Bidding strategy	When looked at more closely, it is a *Dutch auction* for a price per unit, whereby the quantity is derived from a set total price. In other words, to include a strategic margin in a bid on the basis of the indifference price per unit, which takes into account your own *risk aversion* and your assessment of the competition. The lower your own risk aversion and the lower your estimation of the competition, the higher the strategic margin.
Signals between bidders	Not possible.

Continued

13 Continued

Winner's curse	Information cannot be exchanged between bidders, i.e., the danger of winner's curse is not avoided.
Result	The bidder with the highest bid per unit (= indifference price minus strategic margin) wins with his own bid as price.
Special features	Is used by its inventor as a sales auction for contract awards when there is a fixed *budget* (the quantity decreases with the ticker there).
Internet	Possible manually, e.g., via phone or fax, or on an Internet platform.

14 Hong Kong Auction

Negotiation item	Several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The auctioneer reduces the prices in previously set increments (*ticker*) until n–1 winners remain. The last bidder who drops out of the ticker is also a winner.
Commitment	It does not always exist in purchasing auctions for contract awards on Internet platforms, but highly recommended.
Bidding strategy	To include a strategic margin in a bid on the basis of the indifference price, which takes into account your own *risk aversion* and your assessment of the competition. The lower your own risk aversion and the lower your estimation of the competition, the higher the strategic margin.
Signals between bidders	Not possible.
Winner's curse	The Hong Kong ticker cannot be "counted down" and consequently no information is exchanged between bidders, which helps to prevent the danger of winner's curse.
Result	The bidders with the n-highest bids (= indifference price minus strategic margin) win the n-highest bid as price. This corresponds to the Dutch tender auction.
Special features	Is often used as intermediate round for selecting participants in the final round of *hybrid negotiation design*.
Internet	Possible both manually and on Internet platforms.

15 Simultaneous Ascending Auction

Negotiation item	Several objects (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders underbid each other mutually for several items using a *design of auction dynamics* until no bidder submits another bid. This is a question of parallel *dynamic English auctions*, one per object, which have a common design of auction dynamics (for example, the end of the auctions exercise mutual influence).
Commitment	Usually exists with manual sales auctions. It often does not exist in purchasing auctions for contract awards on Internet platforms.
Bidding strategy	To bid precisely to your own indifference price and then give up. Different design of auction dynamics might make slight tips and tricks possible to generate additional information.
Signals between bidders	Possible depending on the design of auction dynamics.
Winner's curse	Depending on the design of auction dynamics, information might be exchanged between bidders, which helps to avoid winner's curse.
Result	The bidders with the n-highest indifference prices get the items with the (approximately) (n+1) highest indifference price as price.
Special features	The cellular phone network license auctions, e.g., those in Germany, were held as simultaneous ascending auctions.
Internet	Possible both manually and on Internet platforms.

16 Dynamic Combinatorial Auction

Negotiation item	Several objects (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	The bidders underbid each other mutually as in a *simultaneous ascending auction*. But bids cannot be submitted only for individual objects, but instead only on combinations of objects, which they only refer to precisely that combination of objects. The auctioneer selects one allocation each time between bidding rounds and tells the bidders the successful bids.

Continued

6 Continued

Commitment	Without commitment, the incentive for bidders becomes weaker to submit a better bid due to the communicated allocation.
Bidding strategy	To bid precisely to your own indifference price and then give up. In this, *substitutes* and *complements* can be considered among the objects.
Signals between bidders	Possible depending on the design of auction dynamics.
Winner's curse	Depending on the design of auction dynamics, information might be exchanged between bidders, which helps to avoid winner's curse.
Result	The bidders with the n-highest indifference prices get the items with the (approximately) (n+1) highest indifference price as price. *Substitutes* and *complements* are considered in the indifference prices among the negotiation items.
Special features	Cellular phone network license auctions in the USA are usually held as dynamic combinatorial auctions.
Internet	Possible both manually and on Internet platforms.

17 Klemperer Auction (Anglo-Dutch Auction)

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Two rounds: In the first round, n+1 participants of the second round are determined with an English auction (*English ticker auction* or also a *dynamic English auction* or *simultaneous ascending auction*). The second, decisive round is held as a *Dutch tender auction* (or with n=1, often also as a *Dutch auction*).
Commitment	Lack of commitment reduces the event to absurdity in the first round for the shortlist.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Possible if a dynamic English auction or a simultaneous ascending auction is selected in the first round.
Winner's curse	Is avoided by the English character of the first round.

Continued

17 Continued

Result	The bidders with the n-highest bids (= indifference price minus strategic margin) get the items at the n-highest bid as price.
Special features	Is recommended by Klemperer above all because participation is also attractive for bidders, who would think they did not have a chance in a pure English auction, for example.
Internet	Both rounds can take place on an Internet platform.

18 Hong Kong-Dutch Auction

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Variant of the *Klemperer auction*, which is held as *Hong Kong auction* in the first round.
Commitment	Lack of commitment reduces the event to absurdity in the first round for the shortlist.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Not possible.
Winner's curse	Is not avoided. In case of doubt, the Hong Kong auction causes the indifference prices to be corrected upward, not downward.
Result	The bidders with the n-highest bids (= indifference price minus strategic margin) get the items at the n-highest bid as price.
Special features	The advantage compared to the Klemperer auction is that a possibly contra-productive signal of the (n+1)-highest indifference price can be replaced by the signal of the n-highest bid at the end of the first round.
Internet	Both rounds can take place on an Internet platform.

19 English Light Auction

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Two rounds: In the first round, m participants (m>n) of the second round are determined using a *first-price-sealed-bid auction*. The second, decisive round is held as a *second-price-sealed-bid auction* (or *n+1) price auction*) a few days later.
Commitment	Lack of commitment reduces the event to absurdity in the first round for the shortlist.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Possible to a limited extent for the bids in the first round.
Winner's curse	Is avoided by the signals of the bids of the first round.
Result	The bidders with the n-highest indifference prices get the items at the (n+1) highest indifference price.
Special features	This auction form is also attractive for bidders, who do not want to participate in a pure English auction for emotional reasons. It represents an English auction for practical purposes anyway. As a variant, a *first-price-sealed-bid auction* can be selected as second round.
Internet	No, both rounds should be held as "simultaneous negotiations" with all bidders at one place.

20 Auction with "Louis Vuitton Cup"

Negotiation item	One or several equal units (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Variant of the Klemperer auction or Hong Kong-Dutch auction, in which one bidder is seeded as participant of the second round. Consequently, the first round only determines n-participants as further participants of the second round.
Commitment	Lack of commitment reduces the event to absurdity in the first round for the shortlist.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Possible depending on whether an English or Hong Kong auction was selected for the first round.
Winner's curse	Winner's curse might be avoided depending on whether an English or Hong Kong auction was selected for the first round.
Result	The bidders with the n-highest bids (= indifference price minus strategic margin) get the items at the n-highest bid as price.
Special features	This auction form can induce individual bidders to take part, who do not want to participate in a pure English auction for emotional reasons but are especially important for the auctioneer.
Internet	Both rounds can take place on an Internet platform.

21 Hybrid Negotiation Form Composed of a TIOLI and an Auction

Negotiation item	One or several objects (number n)
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Two rounds: In the first round, individual bidders are given *TIOLIs* bilaterally; the other negotiation issues concern the second round. If an individual bidder rejects the TIOLI, he may not participate in the second round. Round two is an auction for a very attractive item.
Commitment	The first round requires the best possible reputation for commitment as an ultimatum game. Lack of commitment in the second round works contra-productively against it.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Possible depending on the selected auction form.
Winner's curse	Winner's curse might be avoided depending on the selected auction form.
Result	See the result of the auction form used in the second round. In addition, individual bidders can achieve bilateral negotiation successes.
Special features	The trick with the TIOLI preliminary negotiation should not be overdone. Bidders only accept such an entry barrier if the item of the second round is really much more interesting.
Internet	The second round can take place on an Internet platform.

22 TIOA("Take it or auction")

Negotiation item	**One object**
Sales or purchasing	Both possible; described in sales logic here.
Negotiation design	Two rounds: In the first round, one single bidder is given an offer bilaterally in the form of an ultimatum. If he accepts, there is no second round. If he rejects it, there is an auction in a second round with competitors for the same item.
Commitment	The first round requires the best possible reputation for commitment as an ultimatum game. Lack of commitment in the second round works contra-productively against it.
Bidding strategy	See the bidding strategies for the auction forms used in the individual rounds.
Signals between bidders	Possible depending on the selected auction form.
Winner's curse	Winner's curse might be avoided depending on the selected auction form.
Result	If the participant accepts the offer in the first round, this becomes the result. If he rejects it, then see the result of the auction form used in the second round.
Special features	The relationship to a single negotiation partner can be sounded out before an auction with a TIOA. If he is sufficiently accommodating, then the *competition argument* is often not brought into play. But if he is stubborn, competition should decide the issue. This is very much a question of that communicated between the lines.
Internet	The second round can take place on an Internet platform.

23 Hybrid Negotiation Form Composed of a Quote-for-Ranking and a TIOLI Chain

Negotiation item	One object
Sales or purchasing	Purchasing negotiations with *subcontractors* for a project when you are in the offer phase yourself.
Negotiation design	Two rounds: The first round takes place before you have submitted your own offer. It is composed of a *first-price-sealed-bid auction* with the promise that the incoming bids determine the sequence in the second round. The best bid from the first round is included in your own bid. If you win the order, the second round is held as *TIOLI* chain in the sequence defined by round one, i.e., the first bidder is the first one given a TIOLI. Only if he rejects it is the second bidder given a TIOLI as the next in line, etc. until one bidder accepts his TIOLI.
Commitment	The first round can take with optional commitment under the provision that you are awarded the contract. On the other hand in the second round, you can negotiate with that much more commitment, because the contract has been awarded and subcontractors are needed to fulfill it.
Bidding strategy	See the bidding strategies for the negotiation forms used in the individual rounds.
Signals between bidders	Not possible.
Winner's curse	Is not avoided.
Result	The more bidders reject their TIOLI in a second round, the less harsh the next TIOLI should be given.
Special features	This negotiation form is a healthy compromise with respect to the question of whether you should negotiate with subcontractors before or after you are awarded the contract for a project. It enables attractive prices for your own bid and subsequent price reductions at the same time to get better margins on the already won project.
Internet	Not relevant.

Notes

Introduction

1. Besides, amongst others, Maskin and Myerson

1 Bilateral Negotiations

1. In game theory literature, the pie is called *zone of* (*possible*) *agreement*.
2. In game theory literature, the competition argument is discussed to be driven by the negotiator's *BATNA* – the "best alternative to the negotiated agreement."
3. The negotiation solution to meet halfway is also called a *"fair solution"*; for example, see Berninghaus et al., "Strategic Games," p. 193.
4. Bargaining theory suggests the *Rubinstein solution* in the situation of a "melting pie." For an explanation of the Rubinstein model, see Berninghaus et al., Strategic Games, section 4.2.2.
5. In game theory this is referred as *Harsanyi-Nash-Zeuthen Game*.
6. Generalizations of this principle to more than two negotiating partners are possible, but is very complex. For a more detailed discussion of this method, see Brams/Taylor, "An envy-free cake division protocol."
7. The principle described here in case of a messy divorce may also be applied; for example, in the distribution of an inheritance.
8. One of the most well known books about negotiation is "Getting to *Yes*" by Fisher/Ury/ Patton (The German translation is entitled "Das Harvard Konzept" – the Harvard concept). Without loosing its essence, we can summarize it as "one should negotiate interests but not positions."
9. According to Manfred Holler, even the supermarket must not get a portion of the pie in order to make this an ultimatum game in the strict sense of game theory. But after the butter is not vanishing into thin air if you don't buy it, this detail is not fulfilled here. Here and in the following, we want to use ultimatum game as synonym for *TIOLI* ("*take-it-or-leave-it*") as it will be introduced in the following section. In market theory, the term *option fixer* is used alternatively.
10. Unless the manager wants to entice you into the supermarket with precisely butter.

2 Auctions

1. Here and in the following, "auctioneer" refers to either the seller or the buyer who executes his part of the price negotiation as auction. In general, an *auctioneer* is a third party who acts on behalf of either the seller or the buyer. In this book, we want to abstract from this differentiation.

2. Part IV deals essentially with the topic of binding force or commitment. Using examples, mostly from the area of the awarding of contracts between companies, we show how different bidders can be compared and how you can negotiate in a purchasing situation with commitment. However, a bidding event without commitment rarely results in optimum prices.
3. For example *hood.de*; For an overview of this relatively fast moving world of online auction platforms see Google, search term "online auction".
4. If you observe the individual markets at eBay for a longer time period (e.g., only toy cars or wooden trains), then you will see that there are both sellers' markets (i.e., high demand and consequently exorbitant price in part) as well as buyers' markets (i.e., slight demand consequently sluggish auctions). Although it is a lot less fun for sellers, eBay also seems to work very well in buyer markets.
5. In Section 5.2
6. Sections 1.1 and 1.2
7. Section 1.6
8. See *lot-tissimo.de* for an overview
9. Normally, only selected suppliers can participate and submit bids.
10. Chapter 10 deals with this phenomenon in detail.
11. Section 6.3
12. Of course, this viewpoint assumes that the bidders came to the auction with a set indifference price and did not change it during the auction. We deal with this topic in Chapter 6.
13. In 1996, Vickrey was awarded the Nobel Prize for Economics for his contribution to auction theory. He passed away a few days later at the age of 82. This auction form was named "Vickrey auction" to honor him. Actually, this auction form was already recognized by Johann Wolfgang von Goethe. In 1797, he decided with a second price mechanism which publisher should be awarded his manuscript "Hermann und Dorothea". It was won by Vieweg, see Tietzel/Moldovanu, "Goethe's Second-Price Auction".
14. In Part II, we talk about the bidding strategies in auction forms and see in which situations exchange of information between bidders makes sense and in which situations the auctioneer would prefer to do without this. We also see what the effect is on bidding strategy of the bidder when the bidder does not have to pay his own price in a second-price-sealed-bid auction, but instead only the second-highest bid.
15. You can find an auction theory discussion about this generalized second-price-sealed-bid auction in the scholarly article "Internet Advertising and the Generalized Second-Price Auction: Selling Billions of Dollars Worth of Keywords" by Edelman/Ostrovsky/ Schwarz.
16. The arguments, which we will get to know in Section 5.2 about this, unfortunately often afford little help in actual practice. In the case of the New Zealand cellular phone network license auctions of 1990, above all the incorrect assessment of the effect of several parallel auctions in this special market resulted in a failure, which Milgrom described in detail in Putting Auction Theory to Work, Chapter 1.2.2.
17. We will return to the term of the most cost-effective bid in Chapter 9, for example.
18. Which we will get to know for all auction forms in Part II.

19. We talk about the relation between this "willingness to pay" and the indifference price in the bidding strategy in Section 5.3.
20. Categorization according to Milgrom/Weber A Theory of Auctions and Competitive Bidding, 1982.

3 Negotiations for Several Objects

1. Even if the demand at a price level of 400 euros is greater than the offer for 10 washing machines, the 10 parallel Dutch ticker auctions will result in a price close to the pre-defined end of the ticker.
2. UMTS = Universal Mobile Telecommunications System
3. GSM = Global System for Mobile Communication
4. You can find a detailed discussion of the European UMTS auctions from an auction theory viewpoint in his book Auctions: Theory and Practice (they are called there "›G3‹ Mobile-Phone Auctions"). The mentioned quote is in Wolfstetter, The Swiss UMTS Spectrum Auction Flop: Bad Luck or Bad Design? in footnote no. 13.
5. You can find an overview of the state of research in de Vries/Vohra, "Combinatorial Auctions: A Survey".
6. Section 2.5
7. Section 3.1
8. Or, against his indifference price for only one washing machine if he ignores the simultaneous purchase of the second one. Of course, he can consider selling the second washing machine to someone else, in the same way as the seller of one book can consider buying a second one to meet the demand for a package of two books. These and similar considerations are possible mirrored in the purchasing and sales worlds and correspond analog further.
9. Exactly as in the Dutch multi-unit Auction.
10. This is the price to be paid for the complete quantity.
11. We will return to this when we talk about the bidding strategies at eBay.
12. Consequently, the fixed deposit certificate auction of the private bank was more or less an "American tender purchasing auction with dynamic English components, but fixed bidding deadline."
13. "Dutch Auktion" was the original spelling at *besteauktion.de*.
14. You certainly remember the watch dealer in Section 3.1.
15. See MacKie-Mason/Varian, "Generalized Vickrey Auctions".

4 Basic Principles of Game and Bargaining Theory

1. Actually, the property to be a simultaneous game isn't a necessary condition in the definition of prisoner's dilemma. But the most prisoner's dilemmas described in literature are simultaneous games. Strictly speaking, the example of car drivers described here is no simultaneous game because the players can observe one another during the selection of their alternative. But the described example is a prisoner's dilemma anyway.
2. It was initially an idea of Albert Tucker; Merrill Flood and Melvin Dresher were also involved in discovering the prisoner's dilemma.

3. John F. Nash, Nobel Prizewinner for Economics in 1994 and known thanks to filming of his biography in the Hollywood film A Beautiful Mind, discovered the Nash equilibrium in the 1950s
4. Whether the invisible hand can really be attributed to Adam Smith or whether he has been understood correctly is currently a topic of dispute among historians of economic theory, which should be mentioned here in his honor.
5. In Sommer 2013, the *Markttransparenzstelle für Kraftstoffe* ("transparency center for fuel") was introduced in Germany. This public facility collects by obligation the current fuel prices of all gas stations nationwide and provides them via Internet in freely available "apps" to all consumers (car drivers). A game theoretical analysis of these politically wanted registration offices remains to the reader – but please reflect that this app is also available for the gas stations themselves. In future, they will not even need to make internal calls any more!
6. From the Latin *collusio* = secret accordance
7. A comprehensive game theoretical discussion of the fuel price effect and an interesting possible solution found in West Australia is described in the *Marktbemerkung* „Wie man einen wettbewerbsgerechten Benzinpreis erreichen kann" (*how to reach a competitive fuel price*) by the *Institute for Applied Mechanism Design* under www.ifamd.de.
8. That is the sum of the payouts weighed with the associated probabilities or – in other words – the average payout in a lottery when it is often held.
9. Or put it more precisely in mathematical terms: than the expected value of the utility of uncertain payouts.
10. Section 4.1
11. The mathematical definition of differentiability is to be able to be approximated in each point by a linear function
12. "Affine linear transformation" means changing the absolute level or the average gradient.

5 Rational Bidding Strategies

1. An interesting question is what you should do if you cannot determine your indifference price precisely. Usually, you have to valuate an auction item with a certain degree of uncertainty. What effects this circumstance has on bidding strategy in various auction forms is explained in Chapter 6, which is dedicated specifically to this issue.
2. Costs that arise even without this project and that must be borne by all projects of the company; also called *overhead*.
3. No real costs, but the alternative of possible investment return, on which every company has to measure each of its projects.
4. Section 3.4
5. If it is not outbid, you certainly do not get a bargain if you win the auction.
6. You can find a discussion of the eBay auction designs in the words of one of the leading auction theoreticians in Milgrom, Putting Auction Theory to Work, in the footnote on p. 52.
7. The minimum increment was 1 euro.
8. With an assumed fixed indifference price of bidders; the case of changing indifference prices during an auction is dealt within Chapter 6.

9. See Section 4.1
10. See Section 4.2
11. See Section 4.2
12. Section 4.2
13. Or details of his offer, which are also relevant in other contract awards, e.g., hourly rates or material prices.
14. *Before the start* of the auction, no bidder objects to this, because he must expect to lose himself if another bids too early.
15. Section 4.1
16. It is even possible to set the two payouts in the behavior combination at the bottom left of Figure II.6 to an infinite minus.
17. Section 1.6
18. Brinkmanship is explained in detailed using the example of the Cuba Crisis in Dixit/Nalebuff, Thinking Strategically.
19. Engl. *trembling hand* = certainly not without allusion to Adam Smith's invisible hand. Thomas Schelling describes the trembling-hand concept in his book The Strategy of Conflict. A more recent description is contained in Dixit/Nalebuff, Thinking Strategically.

6 Winner's Curse in an Auction

1. The "equality" of the value of the oil field for the bidders should only be understood excluding individual properties of the bidders, e.g., their production costs. But these can be ignored in comparison to the influence of the oil field size on the valuation.
2. Section 6.1
3. Section 5.2
4. The reason for the behavior of the member of the sales force was an incorrectly set, internal incentive, a "principle agent problem" which has nothing to do with the auction form at first glance. But only the hectic and chaos at the submission of bids in a dynamic English auction gave him the chance to act contrary to the instructions and limits given him correctly.
5. If an English ticker auction is without a clear winner, then the auction item goes to one of those who confirmed the preceding ticker step. The auctioneer sets how this happens in advance (for example, using a first-price-sealed-bid auction).
6. As discussed in Section 4.2

7 Selection of an Auction Form

1. Section 5.4
2. The bidder with the best indifference price might not even win if the bidder with the second-best indifference price only considers a very slight strategic margin, for example
3. For example, see Milgrom, Putting Auction Theory to Work, Section 3.3.4.
4. Section 5.4
5. In the generalization of multi-unit auctions, the second round is a Dutch tender auction; see Klemperer, Auctions: Theory and Practice, section 3.5.3.

6. The Hong Kong auction was proposed as auction design for the 3G cellular phone network license auction in Hong Kong; see Klemperer, Auctions: Theory and Practice, section 4.4.1.
7. As a one-item auction, it becomes a first-price-sealed-bid auction.
8. The idea came from Yale Professor Martin Shubik; see Paulos, A Mathematician Plays the Stock (German: Das einzig Gewisse ist das Ungewisse, p. 65.)
9. Section 3.1
10. Remember that the auction was a flop, because three parallel auctions were held with only three bidders.
11. Compare the "messy divorce" in Section 1.4
12. Section 2.4
13. For a detailed discussion of participation of bidders in an auction, see Klemperer, Auctions: Theory and Practice, chapter 3.3.
14. Section 7.4
15. These terms are even synonymous in auction theory.
16. A benchmark study investigates how much other companies pay for the same or similar things.
17. Section 5.4

8 Disruptive Factors in Auctions

1. Bundling orders simply means awarding them to a supplier as a package.
2. Section 2.4
3. Section 4.2
4. Zip codes were in fact not used, but instead a coding that was easy to interpret by industry insiders. For a detailed discussion of this, see Cramton/Schwartz, "Collusive Bidding: Lessons from the FCC Spectrum Auctions".
5. Section 3.2
6. For example, see Ausubel/Cramton/Milgrom "The Clock-Proxy Auction: A Practical Combinatorial Auction Design". A sealed auction is called a "proxy auction" there.
7. Section 1.6

9 The Comparability of Alternatives using the Bonus System

1. There remains only *one* difference when you consider the role of the auctioneer as seller or purchaser and the role of a bidder as purchaser or party making the offer and you have internalized the "mirror" of the auction theory between sale auctions and purchasing auctions.
2. You cannot decide solely on the basis of the price in sale auctions either. One example involves "*sale and lease back*" transactions, where the seller concludes a lease for the sold item at the same time. The new contract usually involves individual aspects of the individual bidders. Or the seller simply prefers or dislikes individual bidders solely on the basis of his emotions. In these and similar situations, everything that was described in Chapter 9 using purchasing logic can in principle be applied "mirrored" to sales.

3. Total cost of ownership and total value of ownership have been standard concepts in purchasing departments of companies since the 1980s and were probably first formulated by the corporate consultants of the Gartner Group.
4. In recent times, we occasionally meet clients that wonder if this approach could count as *pay-to-play*. In fact it is not only frowned upon but also legally attackable to ask suppliers for an entrance fee for a business award ("pay-to-play"). A reduction of prices in running business as entrance requirement for participation in an awarding event for new business that is per se unconnected to it would exactly belong to that category. The fine difference in the approach recommended here is that the supplier does not only gain the said entrance ticket by reducing prices in running business, but also an advantage from the bonus concerned. My knowledge of interpretation of law is that this is not considered as classical "pay-to-play" and is not legally attackable.
5. The Louis Vuitton Cup is the preliminary round of *America's Cup*, the oldest sailing regatta in the world. The America's Cup is held between two boats on principle: the defender and a challenger. This challenger is determined in a spectacular series of regattas over several years, which climaxes in the Louis Vuitton Cup. Only the winner of the Louis Vuitton Cup may challenge the defender of the America's Cup.
6. Interestingly, it has been observed – although mostly after the fact – that it was usually a big disadvantage for seeded yacht crews not to have taken part in the Louis Vuitton Cup. This has been demonstrated in numerous contract awards, precisely as in the America's Cup 2003 when the defending champion New Zealand suffered a crushing defeat at the hands of the challenger from Switzerland. Consequently, the subsequent defender (Alinghi) changed the rules of the preliminary races to the extent that numerous regattas take place at the start of the Louis Vuitton Cups in which the defending champion also takes part in order to become acquainted with the level of all potential challengers. After defending it successfully, in the meantime Alinghi lost the America's Cup to Oracle Racing around Larry Ellison. For incomprehensible reasons, Ellison changed this rule again, so that Oracle Racing didn't take part in the challenger races ahead of their first Defense in 2013. By that, he probably caused the true reason for the most thrilling final in the 150 years of the history of the Cup: The challenger New Zealand was able to make eight out of nine necessary races victories before Oracle at last managed to handle the new boats and finally managed to defend the Cup nine to eight in the "biggest comeback of sport history". If only Larry Ellison had read my book – it would probably have deprived us all of this extremely thrilling America's Cup 2013.
7. The study "The Role of Reverse Auctions in Strategic Sourcing" by Professor Lutz Kaufmann and CAPS Research confirms that this procedure is widespread today.
8. An exception is when you make a clear separation in the call for bids between payments for the service of development and the order for production from the start. Then it is even recommended not to allow the development partner in the bidding for production and to inform him of that from the start too. This eliminates the incentive for him to create an advantage for himself, for example, with insufficient documentation. But it is even better to give the

supplier the option of the combination of the business models development and production. That is precisely what Arthur Andersen recommended in 2002 in its purchasing study of the automobile industry "Zusammenarbeit oder verschärfte Konkurrenz?" (trans. "Cooperation or Increased Competition"). However, the conclusion, which has become outdated in the meantime, was drawn there that auctions are not possible in the contact of development projects.

9. Section 1.6
10. With complex function specifications, it is actually recommended to approximate the final concept of one supplier (and consequently his bonus) step by step in repeated communication loops lasting several weeks. A similar process, the "*competitive dialog*", is provided for in procurement law.

10 The Commitment of Negotiation Processes

1. Here, we have to mention difficulties with German law: If more than two suppliers have a widely equivalent contract, this counts as *Allgemeine Geschäftsbedingung* (AGB, "general terms and conditions"). For an auction contract, it is the case as soon as more than two bidders participate in the auction, and consequently it is subject to the AGB-law, which disallows certain mechanisms that should have been regulated by the auction contract. In order to avoid this problem, a law different from German law must be chosen. One possibility is e.g. Swiss law.
2. Game theory is used now and then to communicate toughness in competition, even when there is no commitment. For example, a kind of Anglo-Dutch auction without commitment is currently fashionable in the automobile industry. Following a dynamic English auction with feedback of rankings, all bidders are given the chance to submit a final, sealed bid. But the customer reserves the decision about who gets the order for a later time. In one case, a bidder won in the end, who ended the first round without changing his bid in 5th place and had only submitted a bid to be taken seriously in the sealed round. This example demonstrates how the application of the game theory can be reduced to absurdity when it is employed without commitment.
3. The strategy of "burning your own ships" was actually already known in the Middle Ages. William the Conqueror used the same strategy during the conquest of England by the Normans in 1066.
4. See Section 10.1 about auction contracts.
5. Does that remind you of the dynamic combinatorial auction from Section 8.1, in which we also manipulated the allocation given back to "stir up the dynamics"? Contrary to manipulated traffic light colors, we openly communicated the right to manipulation and obligated ourselves in the auction contract to honor each allocation communicated to the bidders if the auction came to a standstill thereafter.
6. Section 7.5
7. According to my interpretation of law, an adaptation of the reservation price during the auction by the auctioneer is not a legal problem as long as each bidder knows at any point of time if the reservation price has been reached or not. Nevertheless, such a behavior would be perceived as being so close to a

phantom bid that I hardly remember any auction where the reservation price wasn't fixed in advance. In case of doubt, the reservation price is deposited at a notary's office in a sealed envelope.

8. Section 1.5. When considered more closely, the trick used here is only analog to negotiation judo. A "tradable" is depicted as a "must-have" there in order to be sold at a high price. But here we presented the "must-have" not to have to hold an auction as a "tradable" in order not to admit our weakness. But this only works if you did not put your commitment at risk with all the consequences for your own reputation for commitment. This risk must be considered very carefully in such a situation.
9. Section 1.6
10. Section 5.4
11. The first alternative is the one selected by the building contractor, i.e., only to negotiate with the subcontractors once the order has been secured. The second alternative is already to select the subcontractors before you are sure to get the order.
12. Wambach demonstrates in "On the Economics of Subcontracting" that the first or second alternative is to be recommended depending on the efficiency of the company due to theoretical considerations. In actual practice, however, striking a balance proves to be a more reliable method, because companies usually do not know whether they are efficient or not before a contract is awarded.
13. The recommendation that it is better to negotiate with commitment does not negate the fact that negotiation success achieved without commitment and consequently without concessions can be worth even more. Instead, this recommendation is based more on the fact that long-lasting negotiation success can achieved more easily with commitment than without it.
14. Section 1.6
15. The effect on economy of scale of bundling was already addressed in Section 8.1.
16. Der kleine Machiavelli by Noll/Bachmann.

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